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THE UNIVERSITY OF ALBERTA
CERTAIN GROUPING COMBINATIONS USED IN
SPLIT GRADE CLASSES IN THE ELEMENTARY SCHOOL
A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE
OF MASTER OF EDUCATION

DIVISION OF EDUCATIONAL ADMINISTRATION

by

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A B S T R A C T

A continuing problem in educational administration is the organization of split grade classes. Although these classes are of frequent occurrence in our schools, there is very little information about them in the educational literature.

The main purposes of this study were to determine whether the achievement of split grade classes in reading and arithmetic was equal to that of single grade classes, and to determine if any particular grouping organization for split grade classes was better than another.

A number of experimental split grade classes at the Grade V and VI level was organized in the fall of 1958 according to a prearranged plan. Each split grade class contained two grades which were either as alike or as unlike in achievement as possible. Control groups for each experimental group were drawn from the single grade classes.

All classes were tested in reading and arithmetic in the fall and again in the spring and the resulting data were analyzed.

Certain of the experimental plans studied contained too few classes to randomize the teacher and class variables. As a result, the validity of some findings may be open to question.

The study concluded that most split grade classes will do just as well in reading and arithmetic as single grade classes. However, achievement in these two subjects may be inferior in certain types of split grade organization. The most satisfactory split grade grouping arrangement was found to be one in which low achievers in the lower grade were combined with high achievers in the higher grade.

It is recommended that a study should be made to determine whether the methods of teaching arithmetic in split grade classes are appropriate for that type of organization. Further, sufficient evidence has been found in the study to show that a larger study of the split grade organization should be made.

A C K N O W L E D G E M E N T S

The completion of this thesis has been possible only through the assistance and cooperation of many people.

The writer is indebted to the many classroom teachers who assisted in the study, to the principals who organized the necessary experimental classes, and supervised the testing programme, to the officials of the Edmonton Public School System who permitted the study to be carried out within the system and assisted with the organization and testing of the experimental classes and the collection of data.

The writer is appreciative of the role played in the completion of this thesis by the members of his committee. To these gentlemen for their guidance, tact, and patience, the writer extends his sincere thanks.

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CHAPTER I

THE PROBLEM

I. STATEMENT OF THE PROBLEM

The purpose of this experimental study was to evaluate certain methods of organizing split grade classes by measuring achievement in arithmetic and reading. The evaluation was conducted with two questions in mind:

1. Are some methods of organizing split grades classes more satisfactory than others?
2. What is the relative level of achievement of the children in split grade and single grade classes?

II. BACKGROUND OF THE PROBLEM

The usual method of organizing school classes is to have one grade in one room. Sometimes, however, two grades are combined. This may occur when there are not enough children at any particular grade level to form a class of satisfactory size. The practice, in this case, is to place enough children from an adjacent grade with these children to make the class the size desired. These two grades are then instructed, whenever possible

as if they were in the same grade. If, as in arithmetic, the requirements for each grade are so prescribed that no combination is possible, then each grade is taught separately.

These classes are known variously as split grades, combined grades, and double grades. The frequency of their occurrence is indicated by the fact that in the period 1955-1961, one out of every six classes in the Edmonton Public School System was a split grade class. Table I shows that the average number per year was 125.5.

III. NEED FOR THE STUDY

There are a number of reasons for undertaking a study of split grade classes. Although split grade classes are of frequent occurrence, the professional literature makes almost no reference to them. Apparently, only two studies have been made. (1) If an administrator wants specific information or guidance in this area, he must rely either on his own experience and judgment or on that of other administrators known to him. When he wishes to examine and evaluate current split grade practices, he requires more specific and objective criteria than that which is now available to him.

- (1) Joseph J. Adams, "Achievement and Social Adjustment of Pupils in Combination Classes Enrolling Pupils of More Than One Grade Level," Journal of Educational Research, 47:2, October, 1953, pp. 151-155; Elton E. Knight, "A Study of Double Grades in New Haven City Schools," Journal of Experimental Education, 7:1, September, 1938, pp. 11-18.

T A B L E I

NUMBER OF SPLIT GRADE AND SINGLE GRADE CLASSES

School Year	Total Number of Classes Grade I-VI	Number of Split Grade Classes					Total	Percent
		1-2	2-3	3-4	4-5	5-6		
1955-56	610	21	21	25	15	25	107	17.54
1956-57	672	22	25	22	21	31	121	18.45
1957-58	734	21	17	26	25	35	124	16.89
1958-59	782	21	16	28	21	38	124	15.86
1959-60	831	14	29	22	25	27	117	14.08
1960-61	846	24	30	31	31	44	160	18.91
Totals	4475	123	138	154	138	200	753	16.82
Average Per Year	745.8	20.5	23.0	25.6	23.0	33.3	125.5	

Split grade classes can be organized according to many plans. Certain plans are favoured by some administrators and disliked by others. No one knows definitely that one plan is better than another. There is need for evidence to which an administrator can turn for guidance when he organizes his own split grade classes.

A teacher is usually reluctant to be placed in charge of a split grade class. If she could group her two grades in all subjects as she does in reading, there would be no problem. The problem arises, however, because she must teach arithmetic and spelling to two grades in the same time that another teacher has available for one grade. Teaching procedures for the split grade situation, therefore, need to be investigated.

Parents often complain when they learn that their child is to be placed in a split grade class. They fear he will not make as much progress as he would in a single grade class. Most administrators in answering these parents assume that the children in these classes will do as well as those in the single grade classes. Statistical evidence of the true achievement level of children placed in split grade classes, therefore, is needed.

The effect of the split grade type of organization on the social and emotional well-being of a child is not known.

In the remainder of the study, it must be remembered that, although many aspects of split grades require study,

this study is concerned only with investigating certain plans for organizing split grades and the relative achievement of the children in them as measured by the tests applied.

IV. DEFINITION OF TERMS

Split Grade Class. In the study, the term split grade class refers to the experimental classes organized for the purposes of the study. Each class combined a group of Grade V children with a group from Grade VI.

Experimental Plan. Children from Grade V were grouped with children from Grade VI according to five numbered plans. The term Experimental Plan with its appropriate number is used to designate a particular method of grouping. For instance, Experimental Plan #1 refers to the plan in which a heterogeneous selection from each grade was combined.

Experimental Group. Each experimental plan required the combination of two groups, one from each grade. Each group is referred to as an experimental group and bears the same number as the experimental plan of which it was a part. In addition, the grade included in each experimental group is identified. For example, Experimental Plan #1 comprised Experimental Group #1 (Grade V) and Experimental Group #1 (Grade VI). Each experimental group was composed of children from a particular range of academic achievement.

Edmonton Standard. In the study, the term Edmonton Standard refers to the means of the achievement tests in reading and arithmetic achieved by the single grade classes in the Edmonton Public Schools during the year of the experiment.

V. LIMITATIONS OF THE STUDY

The experimental classes organized for the purposes of the study included children from only two grades. Other grades might have been included. However, the need to simplify the study precluded their use. For the same reason, only five experimental plans were used although many more were possible.

The number of children and classes in some of the experimental classes was small. Consequently, it is unlikely that the teacher and class variables were randomized. The findings of the study must be interpreted accordingly.

The measurement of student achievement was limited to reading and arithmetic, the two major subjects in the elementary school. The observations made here were confined to the scores obtained from the fall and spring form of each test.

The study did not attempt to investigate the teaching procedures that might be suitable for split grade classes. Nor was it concerned with the effect of this type of organization on the social and emotional well-being of the children in them.

All conclusions made in the study concerning the value of any of the experimental plans and the achievement of the children involved were subject to the foregoing limitations.

VI. ASSUMPTIONS

The children placed in each experimental group were selected on the basis of their general level of academic achievement as measured by the average of the final marks assigned in the preceding school year. The study assumed that this average accurately measured each child's level of achievement.

The study assumed that the tests in reading and arithmetic which were administered for the purposes of the study accurately reflected the level of achievement of the children in these subjects. The study also assumed that these tests were administered and marked with care, and the scores recorded accurately.

CHAPTER II

REVIEW OF RELATED LITERATURE

The educational literature dealing specifically with split grades was found to be very limited. However, the two experimental studies, the few articles and comments found, have received careful consideration. In addition, the literature dealing with pertinent aspects of the organization of school classes, including plans of class organization that have elements in common with split grades, was considered.

Terminology gave some difficulty because several names that can be applied to the split grade type of organization can also be applied to other types of organization such as the nongraded school.

The areas investigated will be discussed in three sections in this chapter. The first will consider the literature dealing with split grades specifically. The second will consider those aspects and plans of class organization that are applicable to split grades. The third section will discuss some of the problems that face a teacher of a split grade class.

I. LITERATURE ON SPLIT GRADES

Studies on Split Grades

Adams (2) investigated the social structure of split grade classes and their level of achievement in relation to single grade classes. In particular he wished to determine whether parents were right in saying that instruction was geared to the level of the lower grade to the disadvantage of the pupils in the higher grade. He confined his attention to only the Grade V students in the Grade IV-V combination, drawing his data from records of tests that had been administered over a six-year period.

He concluded that fifth grade children in split grades classes do just as well in reading and arithmetic as those in regular classes. He believed that this showed the fear of the parents was unwarranted. He also concluded that there was a tendency for pupils in split grades to separate into four groups on the basis of sex and grade level cleavages.

Knight (3) conducted a careful study of the organization of combination grades and their level of achievement. The study was concerned with children in the fourth grade. Two groups of experimental classes were established, one in which fourth grade children were combined with third grade children, and one in which they were combined with those in the fifth grade. Each

(2) Adams, loc. cit.

(3) Knight, loc. cit.

fourth grade child was matched with one in a single grade class.

The teachers in charge of these experimental classes were advised to adjust the curriculum to the needs of the pupils as much as possible, to teach the class as if it were a single grade whenever possible, and to form class groups on the basis of individual needs rather than on that of grade level. Children who were in the lower grade who could do the work of the higher grade were to be encouraged to do so and were to be given a double promotion at the end of the year.

Knight found that the range of pupil abilities in the combination grades was not much different from that in the single grade rooms between the tenth and ninetieth percentiles. However, beyond this range there were found one or two pupils in each combination grade class whose abilities were either much superior or inferior to those of the rest of the group.

Knight made a number of observations which are of importance to this study. (4)

1. Combination grades, he found, were generally organized as an economy measure to take care of small groups of pupils in two adjacent grades.

2. The more common procedures of assigning pupils to combination grade rooms was to place inferior pupils of the upper grade with the superior of the lower.

(4) Knight, op. cit., p. 17.

3. Knight believed that there was some evidence in his study to indicate the average of the upper grade and the superior of the lower grade made the best working combination.

4. Combination grades averaged 0.8 to 2.5 fewer pupils per room than single grades in the same grade and school.

5. Teachers of combination grades generally taught the grades separately in arithmetic and reading.

6. Teachers of single grades divided their classes in various elementary school subjects into as many or more instructional groups than did the teachers of combination grades.

7. Principals and teachers, generally, were not in favour of combination grades, while the children did not seem to have any preference in the matter.

8. Most teachers preferred single grade classes because combination grade classes were considered to require more planning and preparation.

9. Principals were less opposed to combination grades than the teachers were.

Knight concluded that, scholastically, there was little difference, if any, between fourth grade pupils in single and combination grade classes. At least, the children did not suffer educationally from this type of organization. It did not seem to make any difference whether the children were combined with the grade above or the grade below. (5)

(5) Ibid. p. 18.

Polkinghorne reported the results obtained from a questionnaire sent out to 435 schools. (6) Of the 225 schools that replied, eighty-nine reported split grade classes. Combinations were most common in the first four grades. In medium and large city schools, the average class size was twenty-nine and thirty, respectively.

The reason given by 82.9 per cent of the schools for having organized such classes was that it was administratively expedient because of the school's enrollment. (7) This is precisely the reason for the formation of split grade classes in Edmonton schools.

Additional reasons given were that some classes were organized for research purposes (5.7 per cent), to meet individual needs more adequately (35.2 per cent), and to eliminate grade levels (20.5 per cent). Obviously, some of the classes were not split grade classes as they are known in Edmonton schools. Very likely, they could be more properly classified as belonging to the nongraded type of organization. The large proportion of the split grade classes mentioned in the questionnaire, however, appeared to have been formed because of necessity. (8)

Many advantages were cited for split grade classes. An improved relationship between older and younger children was emphasized. Learning skills were improved because younger, capable

(6) Ada R. Polkinghorne, "Grouping Children in the Primary Grades," Elementary School Journal, 50:9, May, 1950, pp. 502-508.

(7) Ibid., p. 504.

(8) Ibid., p. 504-505.

children were stimulated by the older ones. Variations in achievement levels among children could be more readily provided for. Teachers were forced to adjust the level of instruction to the maturation level of the children rather than to their grade level, and to recognize the uniqueness of children. Some schools considered the wide range of abilities in the room to be a definite advantage. (9)

A number of disadvantages were mentioned. Parents were often opposed to their child being in a split grade, especially if he was in the higher grade. They thought he would not do as well. (10) It will be recalled that Adams also found the same concern among parents. (11) A number of Edmonton principals also recognized that parents did not like their children being placed in such classes. In an effort to maintain good public relations, the principals recommended that no child should be placed in such a class two years in succession. (12)

Another disadvantage mentioned in Polkinghorne's article was that the range of ability in such classes was too wide. (13) It will be recalled that Knight's study found the range to be very little wider than that found in regular classes. (14)

(9) Ibid., p. 505-506.

(10) Ibid., p. 506.

(11) Adams, op. cit., p. 151.

(12) Edmonton Public School Board, Report of Leadership Course for Principals and Assistant Principals, March, 1957, p. 2.

(13) Polkinghorne, op. cit., p. 506.

(14) Knight, op. cit., pp.13-14.

Such classes were also said to make increased demands on the teacher's time, especially for planning. She had to be an unusually good organizer to handle such a class. (15) The Edmonton principals also agreed that these classes were more difficult to teach. They suggested that only experienced teachers be placed in charge of them, and that they should be from four to six pupils smaller in size than the regular classes. (16)

The relative difficulty of teaching in a single and in a split grade class was discussed in an article which compiled the views of many schools. The opinion expressed was that all classes are combined or split grade classes - a combination of the individuals enrolled, each of whom must work at his own level. If the teacher recognizes and meets the needs of each individual child, she will find it no harder to teach her thirty or so pupils whether they are working on thirty levels in one grade or on thirty levels in two or more grades. (17)

The children themselves were reported by Polkinghorne to like the variety of interests and the more active atmosphere of these combined classes. Sociometric tests showed that good relationships existed between the children, although when removed from the classroom situation, they sought out their own

(15) Polkinghorne, op. cit., p. 506.

(16) Edmonton Public School Board, loc. cit.

(17) "What About Combination Grades?" Childhood Education, 32:42, December, 1955, pp. 187-188.

age level. (18) Adams, it will be recalled, made much the same finding. (19) In this connection, it is interesting to note that the Edmonton principals advised placing older Grade V's with younger Grade VI's so as to obtain a class in which all the children were close to the same age. (20)

II. CLASS ORGANIZATION

Basic Considerations

Any method of organizing classes, split grades included, must consider the wide range of ability and achievement to be found among children. Organizing children into grades was one of the first attempts to meet this problem of range and it was only partly successful. This resulted in classes composed of children who were essentially the same in age and, it was hoped, in achievement. It soon became evident that each class contained a wide variation in the stages of mental, physical, emotional, social, and scholastic development. Educators began to look for other bases of classification than just grade level. Many methods of classification have since been used so that a teacher might be provided with a group of children who were similar in their level of intelligence and achievement. Otto, however, says that no classification plan will remove the individual differences that

(18) Polkinghorne, op. cit., p. 506.

(19) Adams, op. cit., p. 155.

(20) Edmonton Public School Board, loc. cit.

will still exist between children who are supposed to be relatively homogeneous. (21) The difficulty according to Washburne is that each child has his own characteristic profile of abilities and maturities which do not long remain at any level of classification. (22) No sooner is a class organized according to some classification plan, than the children begin to change, thus modifying the original plan. In fact, the better the teaching, the more the children will diverge from the original plan. (23) But administrators have still continued to group children because of the financial economies possible, and because children are more alike than they are different. (24)

It is accepted that although no group can be completely homogeneous, the range of ability and achievement in any class can be narrowed to a limited degree. (25) This is of importance to the teacher. Too wide a range of ability and achievement in a class would impose a heavy burden on her.

- (21) Henry J. Otto, "Elementary Education: Organization and Administration," Encyclopaedia of Educational Research, New York: The Macmillan Company, 1952, p. 376.
- (22) Carleton W. Washburne, "Adjusting the Program to the Child," Educational Leadership, 11:1, December, 1953, p. 138.
- (23) Hollis L. Caswell, Arthur W. Foshay, Education in the Elementary School, New York: American Book Company, 1957, p. 108.
- (24) Gerthron H. Morgan, "Grouping for Growth and Development," Childhood Education, 30:2, October, 1953, p. 73.
- (25) Walter W. Cook, Grouping and Promotion in the Elementary School, Minneapolis: University of Minnesota Press, 1941, p. 30.

However, it must be noted that although children may be taught in a group, each learns as an individual. (26) Learning for each child must be recognized as a highly individualized process of development.

The educational literature reviewed so far on the organization of classes makes it very clear that the following facts must be accepted.

1. Individual differences do exist among children.
2. Any method of grouping will only partially remove these differences.
3. Learning for each child, no matter how he is taught, is essentially a highly individualized process.

Individualized Instruction

Individualization of instruction has been one attempt to meet the needs of the individual child. Many plans have been introduced, dropped, re-discovered, and modified. (27) Noteworthy examples are the Dalton and the Winnetka plans. According to Washburne, both of these plans used self-instructive materials and were designed to let children work ahead at their own rate. (28)

Plans providing for more individualized instruction, Pittenger has stated, seek to relieve the teachers of at least a

(26) Harlan L. Hagman, The Administration of Elementary Schools, New York: McGraw-Hill Book Company, 1956, p. 165.

(27) Harold G. Shane, "Better Ways of Grouping Children," Childhood Education, 36:8, April, 1960, p. 350.

(28) Washburne, op. cit., p. 140.

portion of their classwork, or to employ additional teachers, or both, in order that more attention may be given to individual pupils. He said that in 1947-1948 about 40 per cent of the 1600 cities covered in a survey reported the use of some plan of this sort and indicated that its use was being extended. (29)

Such individualized instruction might be considered applicable to, and desirable for, the split grade situation. If children are to work as individuals, it should not matter how many grades are represented in any particular room. However, many systems have not moved to individualized instruction because it calls for a marked increase in both quantity and quality of teacher personnel, for different arrangements of school plans, and for a different concept of the school than now prevails amongst most teachers and the lay public. (30) Financial considerations have a large part to play in such decisions, because it is obviously more economical to instruct groups of children. Consequently, the rigid grade type of organization has more often been retained, and with it, split grades.

(29) Benjamin F. Pittenger, Local Public School Administration New York: McGraw-Hill Book Company, 1951, p. 250.

(30) Ibid. p. 297.

Modifications in Grade Organization

Many systems have sought modifications in the grade system of organization which would enable more individualization of instruction while keeping the advantages of group instruction. As Pittenger says, "The trend is definitely toward a mutual adjustment of school and student." (31)

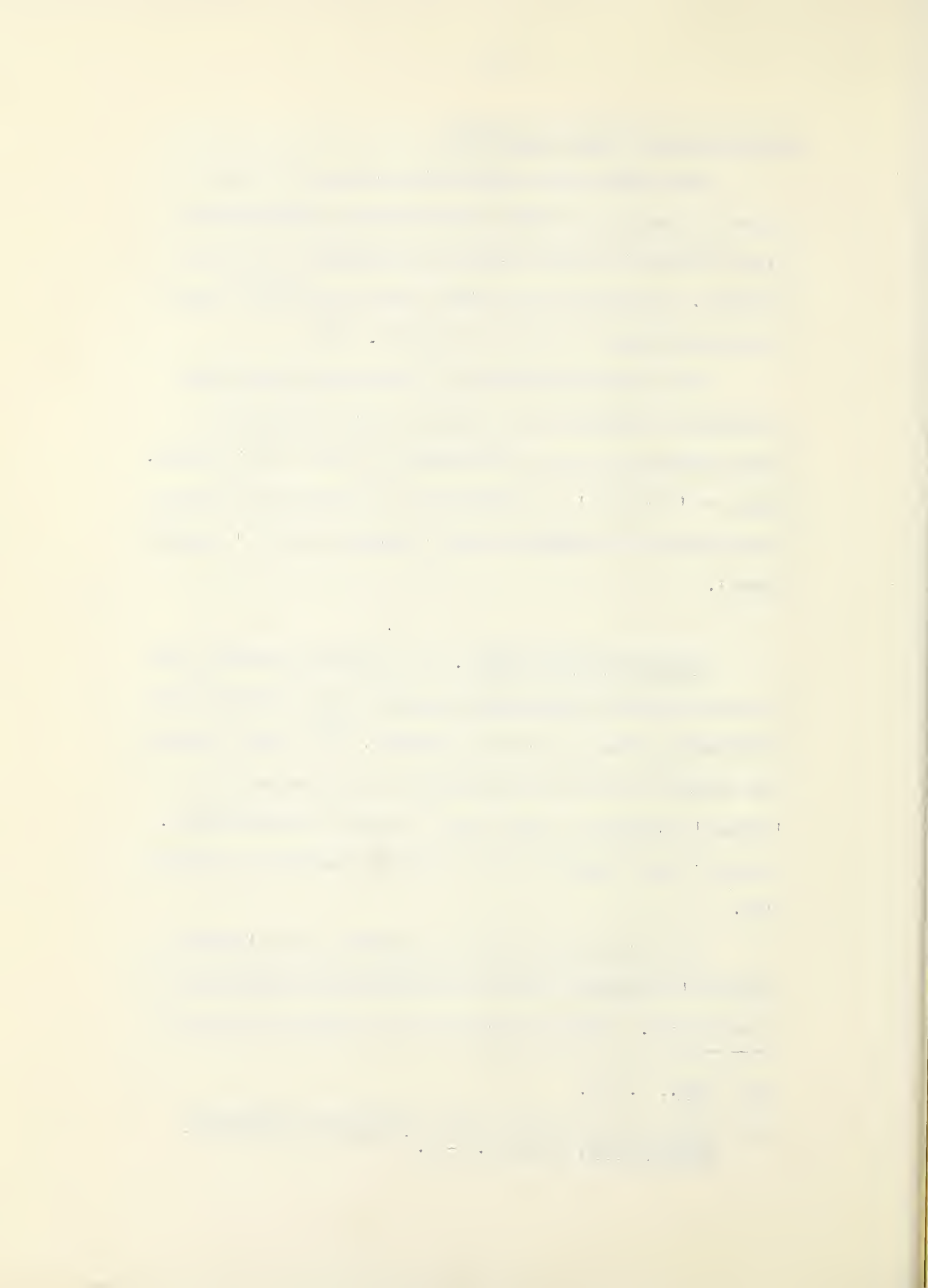
Two of these modifications in the rigid grade system are worthy of attention here because of certain elements in their organization which are applicable to that of split grades. These are 'streaming' as exemplified by the Continuous Progress Plan followed in the Edmonton Public Schools, and the 'nongraded school'.

Continuous Progress Plan. The Continuous Progress Plan is a type of school organization currently being introduced into the elementary public schools in Edmonton. (32) Under this plan, the children in each grade are divided into three parts or 'streams' according to their level of ability and achievement. Each part moves through the six elementary grades at a different rate.

The first group, which is designated as the 'superior achievers' constitutes from 10 to 15 per cent of the children in each grade. They move through the six elementary grades in

(31) Ibid., p. 295.

(32) Edmonton Public School Board, The Edmonton Continuous Progress Plan, 1960, pp. 1-54.



five years, taking the same basic curriculum as the other two groups. However, as much enrichment as possible is provided.

The 'slow learners' make up another group, and they constitute 10 to 15 per cent of the grade population. This group moves at a slower pace than the other groups, taking seven years to complete the elementary programme, and receiving more intensive teaching.

The third group, the 'average achievers', constitutes 70 to 80 per cent of the grade population and moves through the six grades in six years. (33)

Most classes organized under the Continuous Progress Plan are composed of two distinct groups of children: one with a higher level of ability and achievement, one with a lower level. As a result, there is always a definite gap in the range of ability and achievement in each classroom. A typical class combines a group of children who are on the six-year programme with a group that is either on the five- or the seven-year programme. Because each of these groups moves at a different rate through the skill subjects of reading, arithmetic, and spelling, the teacher must instruct each group separately. At the same time, she is expected to adapt her mode of instruction to the needs of each group. In all other subjects, she is encouraged to combine both groups.

(33) Ibid., p. 5-6.

The first part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present. The author then proceeds to discuss the various factors that have shaped the development of the United States, including the role of the government, the influence of the economy, and the impact of the culture. The author concludes by stating that the study of the history of the United States is a task of great importance, and that it is one that should be undertaken by all who are interested in the future of the country.

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The similarity of these classes to the split grade class is clear. Both have two distinct groups placed in a room. Each group must receive separate and appropriate instruction in the skill subjects. In other subjects, the children under both plans are treated as a single class.

It is interesting to note that the type of organization used in split grades, which some consider undesirable, is turned to good use in the Continuous Progress Plan. Because of this type of organization, each teacher must pay attention to individual needs by adapting the rate and type of instruction to the needs of each group.

The Nongraded School. The nongraded school is a type of school organization which is receiving increasing attention in the literature. It seeks to eliminate rigid grade lines and the need for annual promotions. A typical nongraded class usually contains children from one or more grades. Other names for this type of organization are the ungraded school and interage grouping.

The nongraded type of organization does not seem to follow any definite pattern, although the plans in use do have some points in common. (34) They are usually preceded by a kindergarten programme, and are most frequently found in the first three grades. The most common basis for grouping the children into classes is

(34) John I. Goodlad and Robert H. Anderson, The Nongraded Elementary School, New York: Harcourt, Brace and Company, 1959, p. 54.

reading achievement. The main goal seems to be to reduce the range of reading ability with which the teacher must cope. Some plans combine children of similar interests, personality, and backgrounds, while others combine on the basis of chronological age. In the Milwaukee primary schools, a definite attempt is made to have a child in a class no more than one year older or one year younger than his classmates. (35) Other plans, such as those reported by Spain, combine six, seven, and eight year olds in the same room. (36) The result, in most cases, is a classroom composed of children who in a graded school would be representative of two or three grade levels.

Each class may remain with the same teacher for one to three years, depending on the plan. Usually, each class is so organized that the range of ability or achievement overlaps that in other classes. As a result, movement from class to class is relatively easy. The curriculum is usually arranged in units and is carefully articulated to the needs of each group. This differentiation of the curriculum seems to be a basic characteristic of the nongraded school. (37)

Proponents of the nongraded school consider that it provides more opportunities for children to have valuable and needed experience with older and younger children. Spain believes that it recognizes the value of the one-roomed school in this

(35) Ibid., p. 70.

(36) Charles H. Spain, Harold D. Drummond, John I. Goodlad, Educational Leadership and the Elementary School Principal, New York: Rhinehart and Company, 1956, p. 150.

(37) Goodlad and Anderson, op cit., p. 91-92.

respect. This type of organization permits the older children to accept special leadership responsibilities, and enables younger children, especially the very able ones, to work with the older ones and to be stimulated by them. (38)

This point of view has definite implications for split grades. The method of grouping used in the split grade class should be such that the older children in the higher grade can maintain their self-respect. If less capable, older children in the higher grade are combined with more capable, younger children in the lower grade, the result may be an unnatural situation which is undesirable for both groups.

In the nongraded school, the curriculum is viewed as a continuum along which each child moves according to his ability. There are no grade lines and hence no formal promotions to act as a barrier to his natural progress. Careful records are kept on each child to facilitate his progress from teacher to teacher. As a consequence, each teacher must have a broader, deeper understanding of the whole elementary school curriculum, instead of being concerned with only one segment as is so often the case in the graded school. Her duty is to provide each group of children of similar ability and achievement with the necessary experiences to enable them to move along the curriculum continuum with success.

(38) Spain, Drummond, Goodlad, op. cit., p. 150.

The nongraded school demonstrates that combining two or even three grades in one classroom need not be a problem. The teacher simply disregards grade lines and groups her students for instruction according to their needs. The same approach could be used in the split grade classroom.

III. THE TEACHER AND SPLIT GRADES

Range of Achievement

The main objection to the split grade type of organization has been that the teacher must teach a class containing two grades. Two grades, the argument runs, contain a much wider range of achievement than would be found in one grade. Further, a teacher cannot devote as much time to each grade because of the rigid grade requirements, especially in the skill subjects. The literature suggests that these are not necessarily the problems they seem to be.

Cook comments on the variability in achievement to be found in any elementary school class:

" the 99th to the 1st percentile range in any grade is usually about seven times as large as the difference between the two norms for two successive grades while the full range of scores (from the highest to the lowest) in any grade is usually considerably larger. . . These proportions vary somewhat from test to test, but similar facts characterize any test of general achievement at these levels. . . " (39)

- (39) Walter W. Cook, Grouping and Promotion in the Elementary Schools, Minneapolis: University of Minnesota Press, 1941, p. 27.

Further, in reporting a study made in Minnesota, Cook stated that in any grade above the fourth, a teacher may expect almost the complete range of elementary school achievement will be represented. (40) Other writers such as Caswell and Foshay, (41) Goodlad and Anderson, (42) and McNerney (43) agree with Cook on this point.

It is clear that any grade will contain a wide range of achievement, and that placing two grades in one room cannot increase that range very much, if at all. Knight confirms this point of view. (44) If a teacher conscientiously tries to cope with the range of achievement she finds in her class, it really will not matter whether she has one or two grades to teach. Her task will be challenging in either case.

Curriculum

The literature has several suggestions to offer the teacher of a split grade class about the way in which her class may be taught.

The literature on the nongraded school and the Continuous

(40) Ibid., p. 29.

(41) Caswell and Foshay, op. cit., p. 342.

(42) Goodlad and Anderson, op. cit., p. 28.

(43) Chester T. McNerney, Educational Supervision, New York: McGraw-Hill Book Company, 1951, p. 97.

(44) Knight, op. cit., pp. 13-14.

Progress Plan suggests that each class should be so organized that the basic skills of reading, spelling, and arithmetic may be taught to fairly homogeneous groups, each working at its own level. In all other subjects, the children in each class would be treated as one group with due regard for individual differences.

Goodlad and Anderson advance a good argument for this type of teaching. Curriculum areas, they say, differ in significant ways. Some, like arithmetic, are rather rigorous and systematic in their internal organization. A single stimulus will attract and hold the attention of only those children whose background of experience and achievement is such that they can relate to it. Therefore, children of differing experiences and attainments must be subdivided so that groups of considerable homogeneity are established on the basis of present achievement. (45)

Reading procedures that cut across grade lines and group children according to their level of reading ability are well defined and practised. In arithmetic, however, a textbook usually sets the course for each grade. This means that the split grade teacher has two texts with which to contend. Both the Continuous Progress Plan and the nongraded school suggest that this is no problem but is really a desirable situation. Both plans insist that the differentiation of instruction is imperative. Therefore,

(45) Goodlad and Anderson, op. cit., p. 92.

the split grade teacher must accept the fact that she has at least two groups in her room each working in a different arithmetic text, or working at different places in the same text--just as she has in reading.

One further point should be made here. Each of these two plans suggest that any group in any skill subject should be made as homogeneous as possible. A split grade class should, therefore, be so organized that it is composed of two grade groups each of which is as homogeneous as possible.

In most other subject fields, Goodlad and Anderson contend, a single stimulus will elicit further growth from pupils of varying levels of present attainment. The learning outcome-level of insight or understanding, for example - will vary widely from pupil to pupil. The flexibility in individual progress comes, they believe, not from moving a child from group to group according to accomplishment as in arithmetic and reading, but in encouraging and providing opportunity for differing outcomes from a single stimulus situation. Grouping on the basis of present attainment is not necessary in such fields as science, health and social studies. In all but those curricular areas involving rigorous skills or concepts, grouping according to pupil interests within broadly defined areas is entirely appropriate. In science and social studies, for example, it really does not matter if a class stays close to the order of suggested topics. (46)

(46) Ibid.

This argument suggests two courses of action for the teaching of the skill subjects in the split grade class. If the philosophy of the nongraded school is accepted, grade lines in the split grade class will be abolished and the children will be grouped according to their achievement not their grade level. If the philosophy of the Continuous Progress Plan is accepted, grade lines will be retained and each grade will receive separate instruction in the skill subjects. But, under either plan, both grades will be grouped for all other subjects.

IV. SUMMARY

Several conclusions may be drawn from the literature.

1. The level of achievement of both grades in a split grade class is essentially the same as that in single grade classes. The contention of parents and educators that children in these classes will suffer scholastically is not supported by the limited evidence available.

2. The range of ability and achievement in a split class is not much greater, if any, than that found in a single grade class.

3. Grouping techniques used in organizing and conducting split grade classes should endeavour to limit the range of ability and achievement in each group.

4. No method of grouping will make any group completely homogeneous in all respects.

5. Instructional procedures must recognize the individual differences that exist within each group.

6. Possibly, the best working combination in a split grade class might be obtained by grouping the average of the upper grade with the superior of the lower grade.

7. The split grade organization must be such that the children in the higher grade can maintain their self respect.

8. Despite attempts to make it so, a split grade class will usually not be a socially homogeneous one.

9. Children in the higher grade can act as leaders and stimulators of the children in the lower grade.

10. Most split grade grouping arrangements have sought to provide the teacher with two groups of children who can be readily combined in as many situations as possible.

11. In the split grade class, differentiation of instruction is a necessity in the skill subjects. Relatively homogeneous groups within the class are given separate instruction in the skills. These groups may be organized on the basis of achievement and ability, or primarily on that of grade level. This will depend on the educational philosophy of the school or system.

12. The split grade class may be instructed as a unit in all subjects other than the skills.

13. The teacher of the split grade class must be a good organizer and careful planner.

14. Split grade classes are usually organized for reasons of economy rather than to achieve some particular educational goal.

CHAPTER III

EXPERIMENTAL DESIGN

I. INTRODUCTION

Although the following sections in this chapter will develop the procedures followed in the study in more detail, the general procedures followed are outlined below.

1. A number of experimental split grade classes were organized during the school year 1958-1959 at the Grade V and VI level within the Edmonton Public School System according to a pre-arranged plan.

2. These classes, and all single Grade V and Grade VI classes in schools not having a split grade at this level were tested in reading and arithmetic in the fall and the spring. The resulting scores were tabulated by the teachers concerned.

3. The tabulation sheets were collected, the data compiled and analyzed.

II. EXPERIMENTAL CLASSES

Grades Included In The Study

The experimental classes consisted of students from Grade V and Grade VI. This grade combination was chosen because

it occurred more frequently than any other in the Edmonton Schools. As will be noted in Table I, page 3, the yearly average for this combination was 33.3. The next largest, the Grade III-IV combination, averaged only 25.6 classes per year.

As over thirty Grade V-VI split grade classes were to be expected in the year of the experiment, 1958-1959, the inclusion of other grade combinations was not considered necessary. This number of classes was considered large enough to randomize the effects of good and poor teaching, and the differences existing between classes and schools.

Selection of Students

The students placed in these experimental classes were selected on the basis of their general level of academic achievement as measured by the final average earned by each in the preceding school year. These averages can be classified in terms of letter gradings. Any average falling within the range of 85 to 100 percent is termed an 'H' or Honours Standing. An 'A' standing represents any average falling within the range of 70 to 84 percent. An average of 55 to 69 is represented by a 'B' while an average in the 40 to 54 percent range is a 'C'. Under 40 percent is a 'D' or failure. These letter gradings were used in the classification of the children in the experimental classes.

The children in each grade were divided into three categories according to their level of achievement. These are defined below.

1. The Heterogeneous Category. These children were to be representative of the total range of achievement found in each grade in any school. Their achievement level was not significantly different from that of the Edmonton Standard.

2. The High Achievers Category. This category was composed of children who were the highest achievers in their grade in their school. They were to have had either an 'H' or an 'A' standing. If there were not enough children in these categories to form a class of suitable size, then the children with a high 'B' standing were to be included. There were to be no 'C' or 'D' students in this group.

3. The Low Achievers Category. These students were to have been selected from the lowest achievers in their grade in their school. They were to have had a 'C' or a 'D' standing. Children with a low 'B' standing were to be included only if they were needed to bring the class up to the size desired. There were to be no 'A' or 'H' students in this group.

Experimental Plans

The experimental classes were organized according to five distinct plans. Table II summarizes the requirements of each.

Experimental Plan #1. This plan required a heterogeneous selection of students from each grade.

T A B L E I I
PROPOSED COMPOSITION OF EXPERIMENTAL GROUPS IN EACH GRADE

Experimental Plan	Each Experimental Group (Grade V) to include:	Each Experimental Group (Grade VI) to include:
#1	A Heterogeneous Selection *	A Heterogeneous Selection *
#2	High Achievers	High Achievers
#3	Low Achievers	Low Achievers
#4	High Achievers	High Achievers
#5	Low Achievers	Low Achievers

* This group will be identified in the remainder of the study as an 'average' group. This really means that it is composed of typically ungrouped classes whose level of achievement on the fall testing was not significantly different from that of the Edmonton Standard.

Experimental Plan #2. The two experimental groups combined under this plan included children from the high achievers' category in each grade.

Experimental Plan #3. This plan required that each experimental group be composed of children from the low achievers' category.

Experimental Plan #4. This plan required that the experimental group from Grade V be composed of students from the high achievers' category and the Grade VI group be composed of students from the low achievers' category.

Experimental Plan #5. This plan required that the experimental group from Grade V be composed of students in the low achievers' category and the Grade VI group be composed of students from the high achievers' category.

Grouping Plan Assigned to Each School

Every spring each principal prepares for the Superintendent a tentative plan for the organization of his school in the fall. From these plans it was possible to make an estimate of the number of split grade classes expected during the school year 1958-1959, and to determine the schools in which they would be located. The grouping plan each school was to use was determined according to a table of random numbers.

Number of Classes in Each Experimental Plan

As there were over thirty split grade classes expected during the year of the experiment, the initial planning called for at least six classes in each experimental plan.

III. TESTING PROGRAMME

Arithmetic and reading were the two variables measured in the study. A testing programme involving these two subjects was arranged in consultation with the Elementary Office of the Edmonton Public Schools. Dates were chosen which would coincide with the regular fall and spring testing programme, 1958-1959. The first form of each test was administered in the fall while the second form was administered in the spring.

All children in Grade V and VI were included in the testing programme. However, data were derived from only the experimental classes and those single grade classes which were in schools where there was no experimental class.

The tests used are named below. A copy of each arithmetic test is included in the appendix.

Grade V Tests

The California Elementary Reading tests, Form AA and BB, and the Edmonton Arithmetic Achievement Test for Grade V, Fall Survey Form, and Spring Final Form, were administered to all Grade V students.

Grade VI Tests

The Van Wagenen Unit Scale Reading Test for Division II, Form A and B, and the Edmonton Arithmetic Achievement Test for Grade VI, Fall Survey Form, and Spring Final Form, were administered to all Grade VI students.

IV. EXPERIMENTAL PROCEDURES

Distribution of Information

Information dealing with the organization of the experimental split grade classes, the administration of the testing programme, the tabulation of the resulting scores, and the collection of the tabulation was distributed to all schools in late August of 1958. A copy of each form is to be found in the appendix.

Testing and Tabulation

Each teacher was expected to administer the tests to her own class at the appropriate time, to mark the papers and record the score on the tabulation sheets provided. It must be noted that the tests used in the study are administered each year by the teachers of these grades. The only extra work asked of the teachers was the completion of the tabulation forms. These forms were then collected and examined for errors and omissions.

The following May, a letter was sent to each principal to remind him of the June testing schedule. The tabulation sheets were returned to the schools at the same time so that the June test scores could be recorded. Those tabulation sheets which had been incorrectly or incompletely filled in after the fall testing were accompanied by a memo to the teachers concerned asking that the necessary corrections or completions be made. The tabulation forms were again collected and the analysis of the data begun.

V. ANALYSIS OF THE DATA

Steps in the Analysis

The analysis of the data followed the steps listed below.

1. All data were coded and punched on IBM cards.
2. These cards were run through a counting sorter to determine:
 - a) the number of children in each experimental group and in the single grade classes.
 - b) the distribution of ages in each of these groups.
 - c) the distribution of scores on each of the four tests administered.
3. The mean and standard deviation of each test variable, reading and arithmetic, were computed for each group.

4. The adequacy of the grouping in each experimental group was assessed by comparing the fall means of the two variables for each experimental group with those of the Edmonton Standard.

5. Two control groups, one in reading, one in arithmetic, were organized, matching each experimental group.

6. The progress made by each experimental group over the year was assessed by statistically comparing the spring means of the two achievement variables for each experimental group with those of its control groups. The effectiveness of each experimental plan was then evaluated in terms of these findings.

The last three steps are discussed in greater detail in the remainder of this chapter.

Statistical Analysis

The t-test for the means of independent samples was used to discover the significance of any differences found between the means of all groups compared. The fall and then the spring mean of each variable for each experimental group was compared with the corresponding mean of the appropriate control group. First, the mean and standard deviation for each group were computed. Then, the standard error of the difference between the means of each experimental group and its control was

found. Lastly, the value of 't' was computed. The study rejected the null hypothesis in testing the significance of the difference between two groups when the degree of confidence was at the one or the five per cent level.

Adequacy of Grouping

When the experimental groups were organized in September, each was expected to include a particular level of achievement. It was necessary to test the extent to which each group actually contained the intended level. This was done by comparing the fall mean in each subject of each experimental group with the corresponding mean of the Edmonton Standard to find if any significant differences existed between them.

It was expected that the high achieving children placed in the experimental groups would perform at a significantly higher level than the children in the single grade classes. Similarly, the low achievers were expected to perform at a significantly lower level, while the heterogeneous groups were expected to perform at much the same level. If each experimental group performed on the fall testing as expected, then each group could be considered to have been properly organized for the purposes of the study. If any group did not perform as expected, then a re-classification of the achievement level of the group would be necessary.

Although a re-classification was necessary in some instances, it must be noted that each experimental group in its own

school was probably performing as originally classified in relation to the other children in that school.

Controls

The progress made by each experimental group throughout the year was measured through the use of a control in each subject. These controls were established in each subject by progressively removing scores from one end of the total frequency range of the single grade classes. Enough scores were removed to either raise or lower the mean to a figure which was within plus or minus one of the fall mean of the corresponding experimental group.

Despite the fact that the means of each control and its respective experimental group were made equal within a range of plus or minus one, the means were compared statistically to ensure that none of even these small differences were significant. An additional check was carried out. The fall means in both subjects in each experimental group had been compared with that of the Edmonton Standard to determine the adequacy of the grouping arrangements. The means of the controls were compared to those of the Edmonton Standard to ensure that the same relationship existed between them.

In some cases, an experimental group was discovered to have performed in the fall tests at a level not significantly different from that of the Edmonton Standard. In these cases,

the Edmonton Standard was used as the control instead of establishing a special control.

Evaluation of Experimental Plans

The progress made by each experimental group was measured by comparing the spring means of the variables with the respective means of the control groups and noting all significant differences. The experimental plans were then evaluated in terms of these findings.

CHAPTER IV

ANALYSIS OF DATA

I. NUMBER OF CHILDREN AND CLASSES INCLUDED

A total of 3881 children in 145 classes were included in the study. Of the 1917 children in Grade V, 1516 were in single grade classes and 401 were in the experimental classes. Of the 1964 children in Grade VI, 1524 were in the single grade classes and 440 were in the experimental classes.

The 841 children in the experimental classes were in 33 classrooms. This meant that 6 to 7 classes could have been organized according to the requirements of each experimental plan. This did not materialize because some schools had already organized their Grade V-VI split grade class according to a different plan, and in other schools, only one plan was possible because of low enrollments. The plan usually followed in the latter case was Experimental Plan #1. As a consequence, the number of children in this plan is much larger than that in any other.

There were only 13 classes included in the other four experimental plans. As will be noted in Table III, Plan #3 included only two classes, Plan #2 included three, while the other

T A B L E I I I

NUMBER OF CHILDREN AND CLASSES IN SPLIT GRADE EXPERIMENT

Single Grade Classes (Edmonton Standard)	Number of Classes	Number of Children		Totals	Average Class Size
		Gr. V	Gr. VI		
Grade V	57	1516		1516	26.5
Grade VI	55		1524	1524	27.7
Totals	112	1516	1524	3040	27.1
Experimental Plans *					
<u>Gr.V Gr.VI</u>					
#1 : hi + av	20	240	265	505	25.25
#2 : hi + av	3	34	42	76	25.33
#3 : lo + lo	2	23	30	53	26.50
#4 : hi + lo	4	54	53	107	26.75
#5 : lo + hi	4	50	50	100	25.00
Totals	33	401	440	841	25.4
Grand Totals	145	1917	1964	3881	26.7

Legend: 'av' refers to a heterogeneous selection of students whose level of achievement is not significantly different from that of the Edmonton Standard. 'hi' refers to a group of high achievers. 'lo' refers to a group of low achievers.

* The classification of each experimental group in this table is according to the re-classification referred to in Table V, page 48, and not according to the proposed plan, Table II, page 34.

two included four each. The average size of these experimental classes (25.4) was only slightly smaller than that of the single grade classes (27.1).

II. ANALYSIS OF AGE DATA

The mean age of each experimental group and of the single grade classes which made up the Edmonton Standard is reported by grade in Table IV.

In the Edmonton Standard, as might be expected, the Grade VI children were approximately one year older (1.02 years) than the Grade V children. The same situation was evident in the various experimental plans with the exception of Plans #3 and #5. There the differences narrowed to approximately one half year.

The highest mean ages were found in those experimental groups which contained children selected from the low range of achievement. Conversely, the high achievers in each grade had the lowest mean age.

The greatest difference in mean age was found in Experimental Plan #4 where the high achievers in Grade V had the lowest mean age of all experimental groups, and the low achievers in Grade VI had the highest. The same tendency was exhibited by the two groups combined in Experimental Plan #2.

Conversely, the difference in means in Plans #3 and #5

was only about one-half year. In the latter plan, the low achievers in Grade V had the highest mean age of all the Grade V groups while the high achievers in Grade VI had the lowest mean ages of all the Grade VI groups. This would suggest that, although these two groups were unlike academically, there was little difference chronologically. In Plan #3, each experimental group exhibited the highest mean age in all the groups in their respective grade.

III. ADEQUACY OF EXPERIMENTAL GROUPINGS

Introduction

The following discussion on the adequacy of the experimental groupings organized for the study is based on the statistical analysis summarized in Tables VI, VII, VIII, and IX.

It was necessary to reclassify the achievement levels of some of the experimental groups. Table V summarizes this re-classification and supersedes Table II in the remainder of the study.

Grade V Reading

All Grade V experimental groups except #1 were properly constituted for the purposes of the study. Experimental Group #1 which had been expected to perform at a level comparable to that

T A B L E I V
DIFFERENCES IN MEAN AGES OF THE EXPERIMENTAL GROUPS

	Grade V Groups		Grade VI Groups		Differences (Gr. VI-Gr. V)	
	Mean Age	SD	Mean Age	SD		
Edmonton Standard	10.35	.72	11.37	.66		1.02
Experimental Plan						
#1	'hi' 10.36	.65	'av' 11.35	.77		.99
#2	'hi' 10.24	.52	'av' 11.36	.46		1.12
#3	'lo' 11.27	1.04	'lo' 11.73	.69		.46
#4	'hi' 10.22	.61	'lo' 11.45	.83		1.23
#5	'lo' 10.60	.87	'hi' 11.10	.51		.50

Note: The classification of each experimental group in this table is according to the re-classification referred to in Table V, page 48, not according to the proposed plan, Table II, page 34.

T A B L E V

RE-CLASSIFICATION OF COMPOSITION OF EXPERIMENTAL GROUPS BASED ON ANALYSIS OF ADEQUACY OF GROUPING

Experimental Plan	Experimental Groups (Grade V)		Experimental Groups (Grade VI)	
	Reading	Arithmetic	Reading	Arithmetic
#1	*hi	*hi	av	av
#2	#---	hi	*av	*av
#3	lo	lo	lo	lo
#4	hi	*av	lo	lo
#5	lo	lo	hi	hi

Legend: * The asterisk indicates that the original classification of the achievement level of the experimental group was changed from that designated in Table II. 'Hi' means that the level of performance in the fall was significantly higher than that of the Edmonton Standard. 'Av' means that the level of performance in the fall was not significantly different from that of the Edmonton Standard. 'Lo' means that the level of performance in the fall was significantly lower than that of the Edmonton Standard. This coding will be used in all subsequent tables.

This group could not be classified at this time because of insufficient data.

T A B L E V I
COMPARISON OF FALL READING MEAN OF EACH GRADE V EXPERIMENTAL GROUP AND OF ITS
CONTROL WITH MEAN OF EDMONTON STANDARD (GRADE V) TO DETERMINE ADEQUACY OF GROUPING

Group	N	Fall Mean	SD	't' Value	Significance
Comparing Edmonton Standard (Grade V)	1488	96.46	17.33		
With All Groups Below:					
#1 'hi' Control	239 1339	99.98 99.92	16.98 13.43	2.98 5.96	.01 level .01 level
#2 'hi' *	34 *				
#3 'lo' Control	23 260	68.60 69.05	12.08 10.32	10.20 35.09	.01 level .01 level
#4 'hi' Control	54 1028	105.69 105.32	14.33 10.00	4.56 16.25	.01 level .01 level
#5 'lo' Control	50 957	86.50 86.85	14.76 13.36	4.57 15.45	.01 level .01 level

Legend: 'N' means the number of children in each group. 'SD' the standard deviation.
This coding will be used in all subsequent tables where applicable.

* Because insufficient fall data were available for this group, no comparisons could be made.

T A B L E V I I

COMPARISON OF FALL READING MEAN OF EACH GRADE VI EXPERIMENTAL GROUP AND OF ITS CONTROL WITH MEAN OF EDMONTON STANDARD (GRADE VI) TO DETERMINE ADEQUACY OF GROUPING

Group	N	Fall Mean	SD	t [†] Value	Significance
Comparing Edmonton Standard (Grade VI)	1474	25.14	7.67		
With All Groups Below:					
#1 'av' Control *	262 1474	24.81	5.83	0.761	Not significant
#2 'av' Control *	43 1474	25.82	5.42	0.76	Not significant
#3 'lo' Control	30 512	18.50 18.88	5.22 3.74	21.28 24.36	.01 level .01 level
#4 'lo' Control	53 1028	22.25 22.52	5.31 4.67	3.86 10.62	.01 level .01 level
#5 'hi' Control	50 846	29.33 29.04	5.03 3.10	5.59 17.24	.01 level .01 level

* The Edmonton Standard, (Grade VI), was used as the control for Groups #1 and #2 because their means were not significantly different.

T A B L E V I I I

COMPARISON OF FALL ARITHMETIC MEAN OF EACH GRADE V EXPERIMENTAL GROUP AND OF ITS CONTROL WITH MEAN OF EDMONTON STANDARD (GRADE V) TO DETERMINE ADEQUACY OF GROUPING

Group	N	Fall Mean	SD	t ¹ Value	Significance
Comparing Edmonton Standard (Grade V)	1492	66.10	17.74		
#1 'hi' Control	238 1344	69.57 69.47	16.46 14.50	2.99 5.56	.01 level .01 level
#2 'hi' Control	34 1129	73.08 73.74	12.99 11.41	3.02 13.40	.01 level .01 level
#3 'lo' Control	23 458	45.07 45.02	20.74 3.33	4.83 43.22	.01 level .01 level
#4 'av' Control *	54 1492	64.56	15.23	.66	Not significant
#5 'lo' Control	50 916	55.91 55.85	14.83 13.30	4.65 16.14	.01 level .01 level

* The Edmonton Standard, Grade V, was used as the control for Group #4 because their means were not significantly different.

T A B L E I X

COMPARISON OF FALL ARITHMETIC MEAN OF EACH GRADE VI EXPERIMENTAL GROUP AND OF ITS CONTROL WITH MEAN OF EDMONTON STANDARD (GRADE VI) TO DETERMINE ADEQUACY OF GROUPING

Group	N	Fall Mean	SD	t- Value	Significance
Comparing Edmonton Standard (Grade VI)	1496	67.87	16.05		
With All Groups Below:					
#1 'av' Control *	262 1496	68.80	15.41	.90	Not significant
#2 'av' Control *	49 1496	66.52	16.90	.55	Not significant
#3 'lo' Control	30 546	50.15 50.43	13.55 10.38	7.07 28.73	.01 level .01 level
#4 'lo' Control	51 720	54.13 54.23	18.79 11.29	5.05 23.11	.01 level .01 level
#5 'hi' Control	50 903	77.13 77.08	12.67 8.43	4.98 18.42	.01 level .01 level

* The Edmonton Standard, Grade VI, was used as the control for Groups #1 and #2 because their means were not significantly different.

of the Edmonton Standard had to be reclassified as a high achieving group in reading.

The adequacy of the grouping in Experimental Group #2 could not be assessed. Although this group contained $3\frac{1}{4}$ children, only 10 of them wrote the correct test in reading in the fall. Consequently this group could not be considered in the analysis at this time because the analysis would be based on too few cases.

Grade V Arithmetic

Experimental Groups #2, #3, and #5 were properly organized for the purposes of the study. Group #1 which should have performed at a level similar to that of the Edmonton Standard, performed like a group of high achievers and had to be so reclassified. Group #4 which was designed to be a high achieving group in arithmetic performed on the fall testing as if it were an average group and was so reclassified.

Grade VI Reading

All Grade VI experimental groups except #2 performed as expected in the fall testing. Group #2 which was expected to perform as a group of high achievers in reading, performed instead at a level not significantly different from that of the Edmonton Standard. This group was accordingly reclassified as an average group in reading.

Grade VI Arithmetic

All Grade VI experimental groups except #2 performed as expected in arithmetic in the fall testing. As in reading, this group was originally designed to be composed of high achievers but had to be re-classified as an average group in arithmetic.

IV. ORGANIZATION OF CONTROL GROUPS

Two control groups were organized for each experimental group following the method outlined on page 41. As a test of the adequacy of matching, Tables X, XI, XII, and XIII show the results of the comparisons made between these controls and their experimental groups on initial achievement.

In Grade V reading, controls were established for Experimental Groups #1, #3, #4, and #5. No control group could be organized for Group #2 because of insufficient fall data. (See page 46, Grade V Reading). In Grade V arithmetic controls were established for Experimental Groups #1, #2, #3, and #5. No special control was organized for Group #4. Instead the Edmonton Standard was used as the control because this group was average in achievement in the fall testing.

In Grade VI, controls were established for Experimental Groups #3, #4, and #5 in both reading and arithmetic. Groups #1

and #2 were average in achievement in the fall so the Edmonton Standard was used as the control.

V. PROGRESS MADE BY EACH EXPERIMENTAL GROUP

Introduction

The progress made during the year by each experimental group was measured by comparing its spring mean in reading and then in arithmetic with that of the appropriate control, and noting all significant differences. The results of this analysis are recorded in Tables X, XI, XII, and XIII.

The progress made by each experimental group is discussed in the following paragraphs. Table XIV summarizes this discussion.

Grade V Reading

Experimental Groups #1, #4, and #5 closely paralleled the progress of their controls, no significant differences being found between their respective means. The children in Group #3 did not do as well as those in their control group. A difference significant at the five per cent level was found between their means.

Because of insufficient fall data, no estimate could be made of the progress of Group #2. However, the spring mean of this group was not significantly different from that of the

T A B L E X

COMPARISON OF FALL AND SPRING MEANS IN READING OF EACH
GRADE V EXPERIMENTAL GROUP WITH THAT OF ITS CONTROL GROUP

Group	N	Fall Mean	SD	't' Value	Significance	Spring Mean	SD	't' Value	Significance
#1 'hi' Control	239 1339	99.98 99.92	16.98 13.43	.05	Not significant	110.46 110.54	11.33 11.09	.11	Not significant
#2 'hi'	34 *					112.26	13.44		
#3 'lo' Control	23 260	68.60 69.05	12.08 10.32	.16	Not significant	88.54 94.18	11.20 13.42	2.27	.05 level
#4 'hi' Control	54 1028	105.69 105.32	14.33 10.01	.24	Not significant	112.91 113.75	11.88 8.90	1.00	Not significant
#5 'lo' Control	50 957	86.50 86.85	14.76 13.36	.17	Not significant	102.90 103.05	11.62 12.44	.36	Not significant

* Because insufficient fall data were available for this group, no comparison could be made.
See page 46, Grade V Reading.

T A B L E X I

COMPARISON OF FALL AND SPRING MEANS IN ARITHMETIC OF EACH GRADE V EXPERIMENTAL GROUP WITH THAT OF ITS CONTROL GROUP

Group	N	Fall Mean	SD	t' Value	Significance	Spring Mean	SD	t' Value	Significance
#1 'hi' Control	238 1344	69.57 69.47	16.46 14.50	.09	Not significant	67.59 69.01	17.77 19.40	1.11	Not significant
#2 'hi' Control	34 1129	73.08 73.74	12.99 11.41	.29	Not significant	69.02 72.22	19.36 15.66	.95	Not significant
#3 'lo' Control	23 458	45.07 45.02	20.74 9.97	.01	Not significant	47.67 50.64	19.10 15.75	.72	Not significant
#4 'hi' Control	54 1492	64.56 66.10	15.23 17.74	.66	Not significant	60.87 66.45	15.12 19.21	2.52	.05 level
#5 'lo' Control	50 916	55.91 55.85	14.83 13.30	.03	Not significant	53.30 58.15	13.75 16.05	1.25	Not significant

T A B L E X I I
COMPARISON OF FALL AND SPRING MEANS IN READING OF EACH
GRADE VI EXPERIMENTAL GROUP WITH THAT OF ITS CONTROL GROUP

Group	N	Fall Mean	SD	't' Value	Significance	Spring Mean	SD	't' Value	Significance
#1 'av' Control	262 1474	24.82 25.14	5.84 7.68	.76	Not significant	28.65 28.74	4.96 4.75	.27	Not significant
#2 'av' Control	43 1474	25.82 25.14	5.42 7.68	.76	Not significant	29.51 28.74	4.77 4.75	1.04	Not significant
#3 'lo' Control	30 312	18.50 18.88	5.22 3.74	.39	Not significant	24.50 25.95	4.50 4.40	1.72	Not significant
#4 'lo' Control	53 1028	22.25 22.52	5.32 4.67	.36	Not significant	26.56 27.39	4.91 4.35	1.20	Not significant
#5 'hi' Control	50 846	29.33 29.05	5.03 3.10	.38	Not significant	32.20 30.42	4.17 4.07	2.94	.01 level

* The Edmonton Standard, Grade VI, was used as the control for Groups #1 and #2 because there was no significant difference between their means.

T A B L E X I I I

COMPARISON OF FALL AND SPRING MEANS IN ARITHMETIC OF EACH
GRADE VI EXPERIMENTAL GROUP WITH THAT OF ITS CONTROL GROUP

Group	N	Fall Mean	SD	't' Value	Significance	Spring Mean	SD	't' Value	Significance
#1 'av' Control *	262 1496	68.80 67.87	15.41 16.05	.84	Not significant	91.61 93.02	26.72 25.77	.79	Not significant
#2 'av' Control	49 1496	66.52 67.87	16.91 16.05	.55	Not significant	87.64 93.02	22.39 25.77	1.53	Not significant
#3 'lo' Control	30 546	50.15 50.43	13.55 10.38	.11	Not significant	64.50 75.45	21.19 21.31	2.76	.01 level
#4 'lo' Control	51 720	54.13 54.23	18.79 11.29	.04	Not significant	65.70 79.71	26.34 24.01	3.65	.01 level
#5 'hi' Control	50 903	77.13 77.08	12.67 8.43	.08	Not significant	111.90 105.35	18.08 21.79	2.46	.05 level

* The Edmonton Standard, Grade VI, was used as the control for Groups #1 and #2 because there was no significant difference between their means.

T A B L E X I V

PROGRESS MADE BY EACH EXPERIMENTAL GROUP OVER THE YEAR RELATIVE TO ITS CONTROL GROUP

Experimental Plan	Experimental Groups (Gr. V) Reading Arithmetic		Experimental Groups (Gr. VI) Reading Arithmetic	
	Gr. V	Gr. VI		
#1	(hi + av)	---	---	---
#2	(hi + av)	?	---	---
#3	(lo + lo)	below (.05)	---	below (.01)
#4	(hi + lo)	---	below (.05)	below (.01)
#5	(lo + hi)	---	above (.01)	above (.05)

Legend: --- indicates that no significant difference was found between the mean of the experimental group and that of its control group. 'below' indicates that the mean of the experimental group fell significantly below that of the control. 'above' indicates that the mean of the experimental group was significantly higher than that of its control group. The confidence levels are indicated in parentheses. '?' reminds the reader that insufficient data was available.

other high achieving Group #4, nor from that of high achieving Group #1. While it is not known how Group #2 started the year, at least it is evident that this group finished the year achieving at a high level.

Grade V Arithmetic

No significant differences were noted when the means of Experimental Groups #1, #2, #3, and #5 were compared with those of their respective control groups. However, high achieving Group #4 fell far enough below its control group on the spring testing for the difference to be significant at the five per cent level of confidence.

Grade VI Reading

In reading, all experimental groups except #5 did as well as their control groups, no significant difference being found between their means. Group #5, a high achieving group, did much better than its control group, the difference being significant at the one per cent level.

Grade VI Arithmetic

The spring mean of the two average achieving groups, #1 and #2, were both lower than that of their respective controls but there was no significant difference. The two low

achieving groups, #3 and #4, did not do as well as their respective controls, the differences being significant in both cases at the one per cent level. Group #5, composed of high achievers, did much better than any other group in Grade VI arithmetic. Its mean was sufficiently higher than that of its control for the difference to be significant beyond the five per cent level of confidence.

VI. EVALUATION OF THE EXPERIMENTAL PLANS

Experimental Plan #1

This plan combined high achieving Grade V children with a heterogeneous selection from Grade VI whose achievement level in the fall was similar to that of the Edmonton Standard (Grade VI). It will be recalled that this plan originally called for a heterogeneous selection from each grade but that the Grade V group had to be re-classified as high achievers. The difference in mean ages between these two groups was 0.99 years.

Both experimental groups in this plan did just as well as the control groups in both subjects. This indicates that Experimental Plan #1 was a satisfactory method of organizing a split grade class. It should be noted that this experimental plan contained 20 experimental classes.

Experimental Plan #2

When the experimental classes were organized, the intention was to combine two groups of equal relative ability in each of Experimental Plans #1 and #2. The first was to contain a heterogeneous selection from each grade, the second, students of only high ability. Instead, after each group was examined to determine the adequacy of the grouping, these two plans were found to be almost identical in their composition. Each combined high achievers in Grade V with average achievers in Grade VI.

The difference in the mean ages of these two experimental groups in Experimental Plan #2 was 1.12 years. This was slightly higher than the difference between the mean ages of the two grades in the Edmonton Standard.

This experimental plan appears to have been quite satisfactory for the Grade VI's in both subjects and in at least arithmetic for the Grade V's. However, the results obtained in Grade V reading were inconclusive. It is known that this group ended the year working at a high level in reading. Because of the lack of fall data, there is no way to determine whether this group's performance relative to a control had improved, deteriorated, or remained the same.

This plan contained only three experimental classes. However, the fact that the composition and progress of Experi-

mental Plans #1 and #2 were essentially the same, it seems safe to conclude that Experimental Plan #2 was a satisfactory method of organizing a split grade class.

Experimental Plan #3

This plan included low achievers from both grades. The Grade V's did as well as the control group in arithmetic but not as well in reading. In Grade VI, the results were reversed. The Grade VI's did as well as the control group in reading but not as well in arithmetic. The mean ages of the two groups were very close, the difference being 0.46 years. This experimental plan may not have been a satisfactory method of organizing a split grade class. It must be remembered that this finding is based on a sample of only two experimental classes.

Experimental Plan #4

This plan combined Grade V's who were high achievers in reading and average achievers in arithmetic with low achievers in both subjects in Grade VI. The students in both grades did as well in reading as did their controls, but both fell significantly below the control groups in arithmetic. Apparently, this experimental plan was satisfactory as far as reading was concerned but not for arithmetic. Because of the

low level of achievement in arithmetic, this plan must be considered as a possibly unsatisfactory method of organizing a split grade class. The sample on which this conclusion is based included only four experimental classes, however. The mean ages of these two experimental groups showed the greatest difference found between any of the experimental groups--1.23 years.

Experimental Plan #5

This plan which combined low achieving Grade V's with high achieving Grade VI's produced the most satisfactory results of all the experimental plans. The Grade V's did as well as the control groups in both subjects; the Grade VI's were significantly better in both subjects. However, it must be noted that, here too, this finding is based on a sample of only four experimental classes. The mean ages of the Grade VI's was only 0.50 years higher than that of the Grade V's.

CHAPTER V

CONCLUSIONS

AND

RECOMMENDATIONS

I. INTRODUCTION

The conclusions and recommendations made in this chapter are based on the school population studied. In certain instances, the number of classes involved in any one aspect of the experimental plan were greatly below the number to be desired. Consequently, the reader is cautioned in reviewing these findings to recognize the limitations of the study.

The study proposed to find the answers to two questions which are re-stated below.

1. What is the relative level of achievement of children placed in split grade classes and those placed in single grade classes?

2. Which method of organizing split grade classes will produce the most satisfactory level of achievement?

These questions will now be considered in the light of the findings of the study. Question 1, dealing with achievement will be divided into two parts: achievement in reading and achievement in arithmetic.

II. ACHIEVEMENT IN READING

The results obtained in reading were quite clear cut. All experimental groups, except one, progressed through the year, maintaining or improving their positions relative to the control groups. Obviously, as far as reading is concerned, it seems to make little difference whether a child is in a single or a split grade classroom.

Conclusion #1. The level of reading achievement in a split grade class is about the same as in a single grade class, although it may be inferior in certain types of split grade organization.

III. ACHIEVEMENT IN ARITHMETIC

Only three experimental groups out of the ten in the study did not perform at a satisfactory level in arithmetic. Six of the other seven performed at levels not significantly different from that of the control groups, while one performed at a significantly higher level. It seems that the level of arithmetic achievement in most experimental groups was not affected by the split grade type of organization.

Conclusion #1. The level of arithmetic achievement in a split grade class is about the same as in a single grade class, although it may be inferior in certain types of split grade organization.

IV. THE ORGANIZATION OF SPLIT GRADE CLASSES

In this section, Conclusion #1 is based on findings derived from the study of Experimental Plans #1 and #2 which were essentially the same in composition and progress. These two plans included a total of 23 classes.

Conclusion #1. If a split grade class is organized with high achievers from the lower grade and average achievers from the higher grade, the achievement in reading and arithmetic will be about the same as that in single grade classes. Knight also made the same finding. (36)

Conclusions #2, #3, and #4 are based on the findings derived from the study of Experimental Plans #3, #4, and #5 respectively. The size of the sample in each of these plans was small and the conclusions must be interpreted accordingly.

Conclusion #2. Organizing a split grade with low achievers from the lower grade and low achievers from the higher grade may not be advisable.

Conclusion #3. Organizing a split grade class with high achievers from the lower grade and low achievers from the higher grade may not be advisable.

Conclusion #4. The limited evidence available has indicated that a very satisfactory type of split grade organization is achieved by combining children of higher ability from

(36) Knight, op. cit. p. 18.

from a higher grade with those of lower ability from a lower grade.

Conclusion #5. When organizing a split class, it may be inadvisable to place low achievers in the higher grade regardless of their age or ability relative to the children in the other grade.

This conclusion is based on the fact that two of the experimental groups that failed to perform satisfactorily in arithmetic were both composed of low achievers in Grade VI. In Experimental Plan #3, the Grade VI's were less than one half year older than the low achievers with whom they were combined. In Experimental Plan #4, the Grade VI's were 1.23 years older than the high achievers with whom they were combined. In one plan, the Grade VI low achievers were placed with slightly younger children, and, in the other plan, they were placed with much younger children. In one plan they were placed with children of similar ability, and in the other with those of higher ability. It did not seem to matter if these low achievers in Grade VI were placed with children whose age and ability differed widely or not, the results in arithmetic were unsatisfactory.

V. RECOMMENDATIONS

The study has certain recommendations to make in connection with any further studies that might be made in the field of split grade organization. It should be noted here that these recommendations are based on a sample drawn from the public schools of Edmonton. In certain instances, the size of the sample was not as large as would have been desired. Consequently, the recommendations should be interpreted in the light of these two factors.

The Teaching of Arithmetic

The level of achievement in arithmetic was not satisfactory in three out of the ten experimental groups. Was the failure of these three groups really caused by the split grade organization used? If it was, then why was there not a corresponding drop in reading achievement? Is the method of teaching arithmetic in the split grade class not satisfactory? Or were there other factors at work?

Recommendation #1. A study should be made to determine whether the present methods of teaching arithmetic in split grade classes are appropriate for that type of organization.

Repeating the Study

Sufficient evidence has been found in the study to show that a larger study of this subject should be made with more rigid controls in testing and organization. Following are a number of recommendations in this connection.

Recommendation #1. Instead of administering separate tests to each grade as was done in the study, both grades should write the same tests. This would permit more comparisons than were possible in the study.

Recommendation #2. Some schools have very limited enrollments. Therefore, they can organize only split grades classes which are composed of heterogeneous groups. In any replication experiment, schools of this type should not be expected to use any other split grade organization than Experimental Plan #1 where both groups were heterogeneous.

Recommendation #3. The number of classes included in each experimental plan should be large enough to ensure the validity of the findings.

Recommendation #4. The study was carried out within one school system. The findings might be a phenomenon of the system. Any replication study should be carried out in several places.

Recommendation #5. More rigid controls must be used to ensure that each experimental group is properly constituted in the fall and that it is maintained throughout the year.

Other Factors

Recommendation #1. The study has indicated that certain types of split grade organization may be more satisfactory than others. Further investigation is required to determine the reasons for the success or failure of these grouping arrangements. Such an investigation might consider the effects of social and emotional factors, variations in teaching practices and the quality of teaching. It might also consider the effect of this type of organization on the attitudes of pupils, their parents, and teachers.

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APPENDIX A

August 25, 1958.

Dear Sir:

What is the best way to organize a split-grade class?

Here is a question that faces almost every administrator in charge of students in the elementary grades. No research or other objective information seems to be available to guide an administrator as he sets up these classes. As a result, most 'play it by ear'.

The writer, in connection with the writing of his thesis, proposes to investigate this matter of split-grades to see if the most effective way of organizing these classes can be determined.

The proposed study calls for:

- (1) the organization of a number of experimental split-grade classes according to a set plan at the Grade 5-6 level.
- (2) the administration by the teachers concerned of the first and final forms of the Edmonton Arithmetic Achievement Tests, the reading tests usually given in Grade 5 and 6, and the tabulation of the raw data derived.

This study cannot succeed without the cooperation of every principal who has a split grade 5-6 class in his school. This study requires as many of these classes as possible in order to balance out teacher and inter-class differences.

The main office has indicated that your school expects to have or may have a split-grade 5-6 class during the coming school year.

Will you help? You would, of course, be advised of the results. You may be assured, also, that the results will never be used to compare individual teachers, classes, or schools. This study is concerned only with larger groups.

The writer realizes that many administrators have already completed a tentative organization of their classes for the fall term. However, because of the fluctuations in grade enrolments between the time of organization and the opening of school, it is hoped that the necessary flexibility of any organization will permit the formation of these special groups at this time.

The attached sheet outlines the exact steps in the experimental set-up, and your part in it. Will you complete the attached Response Sheet and send it in to Mr. D. Cooney's office as soon as you can?

Your cooperation in this study is very earnestly solicited.

Yours sincerely.

W. H. Evans, Principal,
Dovercourt School.

WHE:bm

EXPERIMENTAL ORGANIZATION:

All grouping schemes have been assigned to schools expecting a split-grade class at the Grade 5-6 level by random numbers. Therefore each school has an equal chance to have any particular grouping scheme.

The grouping scheme that each administrator is asked to organize in his school may not be in accord with his particular philosophy. However, the results of this study would be seriously invalidated if all groups listed below were not used.

You are asked to organize ONE Grade 5-6 split-grade class according to PLAN stated below.

GROUPS TO BE COMBINED IN THE GRADE 5-6 SPLIT-GRADE CLASSES:

(Selection on the basis of academic achievement as measured by the final average assigned in the previous grade.)

	<u>Grade 5 to consist of:</u>	<u>Grade 6 to consist of:</u>
PLAN 1	A heterogenous selection from the total grade population in the school.	A heterogenous selection from the total grade population in the school.
PLAN 2	A selection from the higher range of the total grade population in the school.	A selection from the higher range of the total grade population in the school.
PLAN 3	A selection from the lower range of the total grade population in the school.	A selection from the lower range of the total grade population in the school.
PLAN 4	A selection from the higher range of the total grade population in the school.	A selection from the lower range of the total grade population in the school.
PLAN 5	A selection from the lower range of total grade population in the school.	A selection from the higher range of the total grade population in the school.

It will be noted from the table of groupings that the children in any one grade fall into three main categories:

- (1) those students who are selected from the higher range of the total grade population in the school, i.e. would have an 'H' or 'A' standing. 'B's' would be included only if there were not enough of the other two standings to make up a large enough grade group. There would be no 'C' or 'D' students in this group.
- (2) those students who are selected from the lower range of the total grade population in the school, i.e. who have a 'D' or 'C' standing. 'B's' would be included only if necessary to make up a group of sufficient size. There would be no 'A' or 'H' students in this group.
- (3) those students who are representative of the total range of achievement found in that grade.

'H' (85-100); 'A' (70-84); 'B' (55-69); 'C' (40-54); and 'D' (Under 40) are defined as on the Division II report card.

These standings would be determined from the final average assigned each child in the previous grade in June, 1958. It is assumed that this average will not include the marks assigned for music, art, and physical education.

TESTING SCHEDULE:

The teachers in charge of these split-grade classes would administer the following tests, and tabulate the raw scores on forms to be provided:

(1) READING TEST:

Grade 5	-	California Elementary Reading Test
Grade 6	-	Unit Scale Reading Test - Division II
Form A (AA)	Sept. 17, 1958	9:30 A.M.
Form B (BB)	June 3, 1959	"

(2) EDMONTON ARITHMETIC ACHIEVEMENT TESTS FOR GRADE 5 and 6

Survey Form	Part 1	Sept. 18, 1958	9:30 A.M.
	Part 2,3	Sept. 19, 1958	"
Final Form	Part 1	June 4, 1959	9:30 A.M.
	Part 2,3	June 5, 1959	"

RESPONSE SHEET

NAME OF SCHOOL _____

- (1) This school will have a split-grade class this fall made up of Grade 5 and 6 students.

YES

NO

- (2) A split-grade class will be organized in this school this fall according to Plan _____ as requested.

YES

NO

Signature of Principal

(Mail to the office of Mr. D. Cooney, Edmonton Public School Board.)

The enclosed material has been sent to all schools expecting a split-grade at the Grade 5-6 level this coming school year.

If you should find that you will have to organize such a class in your school, would you examine the attached material and advise Mr. Cooney's office by means of the enclosed Response Sheet whether you will be able to help in the study.

A phone call to the undersigned at Dovercourt School any afternoon when school is in session will give you the grouping scheme to use in your school. You will note in the enclosed material that the grouping schemes are assigned by random numbers.

W. H. Evans, Principal,
Dovercourt School.

Home Phone: 662622

School Phone: 556171

TABULATION SHEET: (Please use a separate sheet for each grade)

SCHOOL _____ TEACHER _____ GRADE _____

This is a (1) single-grade class _____ or (2) part of a split-grade class . _____

Please record only the total raw score earned on each test.

No.	SEX	AGE (to nearest half year)	READING SCORE		ARITHMETIC SCORE		NAME OF PUPIL
			Sept	June	Sept.	June	
01							
02							
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							



May 25, 1959.

Dear Mr. Principal:

Last fall you were good enough to organize a special Grade 5-6 split-grade class in your school according to a pre-determined plan and/or to have your Grade 5 and 6 teachers tabulate the results of the initial Arithmetic Survey and Reading Tests. Your help has been invaluable and appreciated.

Your cooperation is again needed so that the final data required for this split-grade study may be collected.

Enclosed with this letter are:

1. the same tabulation sheets that were completed in your school last fall. Two extra columns have been attached for this June's results. In some cases, where the data was not completed last fall a note has been attached for the attention of the teacher concerned.

2. some instruction sheets for your teachers

3. a verification sheet for your personal attention.

Would you once more help in this study by ensuring that the testing schedule is followed, the results tabulated, and the sheets mailed in to the office of Mr. D. Cooney by June 15?

When this study is completed, you will be advised of the results.

We realize that this is adding one more job to your already heavy load but we hope for your continued cooperation.

D. E. Cooney, Supervisor,
Elementary Education,
Division 11

A. G. Bayly,
Assistant Superintendent,
Elementary Education

May 22, 1952

Dear Mr. Principal:

Last fall you were good enough to send me a copy of the Grade 2-3 spelling test class in your school. I am glad to have your results of the initial spelling test. Your help has been very valuable.

Your cooperation is again needed so that the final data required for this split-grade study may be collected.

Enclosed with this letter are:

1. The same tabulation sheets that were completed in your school last fall. Two extra columns have been attached for this year's results. In some cases, where the data was not completed last fall a note has been attached for the attention of the teacher concerned.

2. Some instruction sheets for your teachers.

3. A verification sheet for your personal attention.

Would you once more help in this study by ensuring that the testing schedule is followed, the results tabulated, and the sheets mailed in to the office of Mr. W. Cooney by June 1st?

When this study is completed, you will be advised of the results.

We are sure that this is adding one more job to your already heavy load but we hope for your continued cooperation.

A. D. Fryer,
Assistant Superintendent,
Elementary Education

D. E. Cooney, Supervisor,
Elementary Education,
Division II

May 25, 1959.

Dear Teacher:

You will remember that a study is underway in our school system to determine the best way of grouping children in split-grade classes. Last fall, a number of specially arranged split-grade classes were set up at the Grade Five and Six level. The arithmetic and reading scores made by the children in these classes and all other Grade Five and Six children in schools not having these split-grade classes, were tabulated on special forms by the teachers concerned.

Your assistance in this study has been invaluable, and appreciated. Your cooperation is again solicited so that the final data may be gathered.

1. Your principal will return to you the same tabulation sheet that you completed last fall, with two columns added to it.

2. In the two attached columns you are asked to place the scores that your students make in the Final Arithmetic Achievement Test and the reading tests to be administered in June according to the following schedule:

A. Reading Test: Grade 5 - California Elementary Reading Test Form BE

Grade 6 - Unit Scale Reading Test

Form B

JUNE 3, 1959 at 9:15 A.M.

B. Edmonton Arithmetic Achievement Tests for Grade 5 and 6

Final Form Part 1 June 4, 1959 at 9:15 A.M.

Part 2,3 June 5, 1959 at 9:15 A.M.

3. Absentees: Test any absentees in the afternoon for the first of the following week.

4. Record the total number of marks that can be earned in each test. The arithmetic scores should include the weighting usually given to the problem section. Otherwise, do not convert the scores in any way.

5. If a student has transferred in or out - do not worry over recording any marks for him or her. This study will use only the scores of children who have been in your room all year.

6. If you are wondering about the extra figures on your sheet: all this data will be punched on IBM cards. The added figures are code numbers for identifying the data.

7. You are asked to turn your sheets in to your principal in sufficient time so that he can turn them in to Mr. Cooney by June 15.

D. E. Cooney, Supervisor
Elementary Education
Division II

A. G. Bayly
Assistant Superintendent
Elementary Education

My dear Mr. [Name],
I have your letter of the 10th inst. and am
glad to hear that you are well. I am
also well and hope this finds you the same.
I have not much news to write at present.

I am, however, very busy at present with
my work, but I will write again soon.

Yours very truly,
[Signature]

P.S. I have not yet received your letter
of the 15th inst. I will try to find it
when I next see you.

Very truly,
[Signature]

I have not yet received your letter
of the 15th inst. I will try to find it
when I next see you.

Very truly,
[Signature]

I have not yet received your letter
of the 15th inst. I will try to find it
when I next see you.

Very truly,
[Signature]

I have not yet received your letter
of the 15th inst. I will try to find it
when I next see you.

Very truly,
[Signature]

I have not yet received your letter
of the 15th inst. I will try to find it
when I next see you.

Very truly,
[Signature]

I have not yet received your letter
of the 15th inst. I will try to find it
when I next see you.

Very truly,
[Signature]

I have not yet received your letter
of the 15th inst. I will try to find it
when I next see you.

Very truly,
[Signature]

I have not yet received your letter
of the 15th inst. I will try to find it
when I next see you.

Very truly,
[Signature]

I have not yet received your letter
of the 15th inst. I will try to find it
when I next see you.

Very truly,
[Signature]

I have not yet received your letter
of the 15th inst. I will try to find it
when I next see you.

Very truly,
[Signature]

I have not yet received your letter
of the 15th inst. I will try to find it
when I next see you.

VERIFICATION SHEET fromSchool
(Please write in name of school)

According to our records the Grade 5-6 split-grade class in your school is organized according to Plan _____.

1. Is this correct? Yes No (Please circle correct answer)
(The five plans have been listed below for your convenience)

2. If this is not correct, please circle the number of the plan that your school has followed:

Plan 1 2 3 4 5

3. If none of these plans has been followed, what plan did you follow in organizing your Grade 5-6 split-grade class?

I selected the Grade 5's from

I selected the Grade 6's from

Please return this verification sheet with the completed tabulation sheets to the office of Mr. D. Cooney, by June 15.

.....

Grade 5 to consist of:

Grade 6 to consist of:

PLAN 1 A heterogenous selection
 from the total grade
 population in the school.

A heterogenous selection
from the total grade
population in the school

PLAN 2 A selection from the high-
 er range of the total grade
 population in the school.

A selection from the high-
er range of the total grade
population in the school.

PLAN 3 A selection from the lower
 range of the total grade
 population in the school.

A selection from the lower
range of the total grade
population in the school.

PLAN 4 A selection from the higher
 range of the total grade
 population in the school.

A selection from the lower
range of the total grade
population in the school.

PLAN 5 A selection from the lower
 range of total grade
 population in the school.

A selection from the higher
range of the total grade
population in the school.

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To the Classroom Teacher:

Examination of these tabulation sheets has shown that some sheets were not completed last fall.

___1. the ages were not recorded.

___2. the ages were recorded only to the nearest year when they are needed to the nearest half year.

e.g. (1) 10 years plus 4 to 9 months - 10.5 yrs.

(2) 9 years plus 10 to 12 months and

10 years plus 1 to 3 months - 10.0 yrs.

___3. the grade in which child in a split-grade class was placed was not given.

___4. the reading test score was changed from the original test total requested. (Gr. V possible 130; Gr. VI possible 40)

A check mark is placed beside the item that indicates where this particular tabulation sheet was not complete. You are requested to complete the original data in this regard.

APPENDIX B

EDMONTON ARITHMETIC SURVEY TESTS

Designed for Use in September

SERIES

A

ACCURACY, LANGUAGE AND FUNDAMENTAL OPERATIONS,
PROBLEMS

*BEGINNING

GRADE

5

NAME SCHOOL DATE

SCORE SUMMARY

PART A—ACCURACY

Pupil's
Score

PART B—LANGUAGE AND FUNDAMENTAL
OPERATIONS (30)

1. Addition (7) x 1 =

2. Subtraction (7) PART C—ARITHMETIC PROBLEMS (10)

3. Multiplication (7) x 3 =

4. Division (7) TOTAL—PARTS B & C (60)

5. Fractions (12) weighted

TOTAL — PART A (40) TOTAL — PARTS A, B AND C

Consult Memo for Administering and Scoring Directions.

PART A—ACCURACY

1. ADD: (3 minutes)

			847	1738	371	\$29.28
		\$70.67	635	29	8255	45.31
78	209	3.76	298	65	58	23.79
64	683	51.35	607	6	1717	4.53

2. SUBTRACT: (3 minutes)

77	896	800	\$5.03	8356	8562	\$100.04
48	627	428	2.27	2379	8496	84.72

3. MULTIPLY: (5 minutes)

\$8.15	650	406	27	456	\$.65	598
6	9	7	60	38	4	94

Page 4

PART C—ARITHMETIC PROBLEMS

This is a test to see how well you can do arithmetic problems. You are to do as many questions as you can. Do all your work beside the problems and then put your answers in the proper places at the right.

PROBLEMS

WORK HERE

ANSWERS

1. 3 girls sold 59 bags, 68 bags, and 65 bags of popcorn. How many bags did they sell altogether? (1) _____
2. To have 3,000 storybooks in the library instead of the 1,566 we now have, how many books will be needed? (2) _____
3. A man worked 3 hours to fix a radio. At \$2.25 an hour, how much was the bill? (3) _____
4. Joe saved \$3.96 in 4 weeks to buy a big cowboy hat. Each week he saved the same amount. How much money was that a week? (4) _____
5. Donald can swim the length of the indoor swimming pool 4 times without stopping. The pool is 60 feet long. How far can Donald swim without stopping? (5) _____
6. Mr. Jones makes a 185 mile trip 5 times a month. How far does he travel each month? (6) _____
7. If bricks of ice cream are cut into 6 pieces, how many bricks are needed for 24 pieces? (7) _____
8. There were 20 people at the picnic. $\frac{1}{5}$ were adults. How many adults were at the picnic? (8) _____
9. Mother bought a 5-pound piece of meat at 78¢ a pound. How much was her change from \$5.00? (9) _____
10. Four watermelons weighed 35 pounds, 51 pounds, 48 pounds, and 42 pounds. Find the average weight. (10) _____

EDMONTON ARITHMETIC ACHIEVEMENT TESTS

SERIES
3

FINAL
GRADE 5

SCORE SUMMARY

Consult Manual for Administering and Scoring Directions

	A	B	C	B & C
Pupil's Score				
	60	20	30	50
Pupil's Percentile Rank				
	%ile		%ile	

PART A—ACCURACY

VALUE—1 mark each

1. ADDITION (5 minutes)

		947	679	758
	975	659	968	496
	87	696	779	879
779	648	594	855	360
564	899	847	359	325
748	8	978	685	142
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
\$9.32				\$ 11.78
4.38	9104	5731	2386	67.79
1.27	6783	404	7775	557.83
7.59	8860	4968	3673	7.00
9.86	569	491	7524	36.59
4.56	9490	5857	9796	.52
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

2. SUBTRACTION (4 minutes)

4 0 4 6	1 1 6 0 4	1 7 0 3 0	\$ 50.00	2 0 0 0 0
3 5 6 1	7 9 3 7	4 3 6 7	2 4.6 8	1 6 1 0 7
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
1 4 2 7 0	1 2 4 0 4	\$ 1 2 4.2 0	\$ 1 4 6.6 6	1 0 8 2 5 6
5 3 7 8	7 8 0 7	6 6.8 6	5 9.7 6	4 0 5 0 9
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

3. MULTIPLICATION (7 minutes)

69	42	561	827	9063
20	43	39	65	86
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
3846	\$60.09	216	485	\$98.54
97	504	143	804	3290
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

4. DIVISION (8 minutes)

$$4 \overline{) 368}$$

$$9 \overline{) \$17.17}$$

$$35 \overline{) \$10.50}$$

$$43 \overline{) 1756}$$

$$97 \overline{) 44832}$$

$$67 \overline{) 26952}$$

$$74 \overline{) 518678}$$

$$18 \overline{) 13410}$$

$$16 \overline{) 640080}$$

$$37 \overline{) 15928}$$

5. ADD FRACTIONS (3 minutes)

$$\frac{1}{7}$$

$$7 \frac{1}{8}$$

$$\frac{5}{8}$$

$$7 \frac{1}{5}$$

$$\frac{1}{2}$$

$$\frac{3}{7}$$

$$4 \frac{5}{8}$$

$$\frac{7}{8}$$

$$\frac{7}{10}$$

$$\frac{1}{8}$$

$$3 \frac{1}{8}$$

$$1 \frac{1}{2}$$

$$1 \frac{1}{2}$$

$$14 \frac{1}{4}$$

$$1 \frac{3}{4}$$

$$\frac{3}{4}$$

$$1 \frac{3}{4}$$

$$1 \frac{1}{2}$$

$$8 \frac{1}{3}$$

$$2 \frac{1}{8}$$

$$7 \frac{1}{2}$$

6. SUBTRACT FRACTIONS (3 minutes)

$$\frac{15}{16}$$

$$9 \frac{1}{2}$$

$$1$$

$$7 \frac{7}{8}$$

$$\frac{3}{4}$$

$$\frac{7}{16}$$

$$6$$

$$\frac{5}{8}$$

$$1 \frac{1}{8}$$

$$\frac{2}{5}$$

$$\frac{1}{2}$$

$$5 \frac{1}{4}$$

$$1 \frac{1}{4}$$

$$7 \frac{1}{6}$$

$$8 \frac{1}{3}$$

$$\frac{1}{8}$$

$$2 \frac{1}{8}$$

$$\frac{3}{4}$$

$$4 \frac{5}{6}$$

$$2 \frac{1}{4}$$

PART B—NUMBERS AND MEASURES TIME—10 minutes VALUE—1 mark each

This is a test to see how well you remember facts about our number and measuring systems. You can do most of the questions in your head. The rest can be figured out with a little pencil work. Put your answer in the spaces at the right.

Answers

1. Write the Roman Numeral for 42 (1) _____
2. Change $\frac{8}{10}$ to its simplest form (2) _____
3. Six is what fraction of eight? (3) _____
4. What is the distance around a field which is one mile square? (4) _____
5. Write an improper fraction having a denominator of 5 (5) _____
6. Write "one million, three hundred" in figures (6) _____
7. Which is larger, an improper fraction or a proper fraction? (7) _____
8. How many digits are there in 758,023? () _____
9. What is the dividend when 43 is divided by 6. (9) _____
10. How many hours is it from 8 A.M. to 5 P.M.? (10) _____
11. What is the ninth month of the year called? (11) _____
12. When it is 9 A.M. in Edmonton, what time is it in Vancouver? (12) _____
13. On a map whose scale is 1"=50 mi., how long a line should you draw to show a distance of 200 miles? (13) _____
14. What is the average of 10, 8, 0, 5 and 7? (14) _____
15. 288 oz. equal how many lbs.? (15) _____
16. If you gave 3 quarters for a 59c purchase, what 3 coins could you receive in change? (16) _____
17. How many lbs. are 5 T. 500 lbs? (17) _____
18. How many pecks are 1 bu., 3 pecks? (18) _____
19. How many feet are there in 3 miles? (19) _____
20. Which is more? 5 gal. or 38 pt.? (20) _____

Number correct _____

PART C—ARITHMETIC PROBLEMS

TIME—20 minutes

VALUE—3 marks each

DIRECTIONS TO PUPILS—This is a test to see how well you can do arithmetic problems. You are to do as many questions as you can. Do all your work beside the problems and then put your answers in the proper places at the right.

PROBLEMS	WORK HERE	Answers
1. Mary has 2 dolls. One weighs $3\frac{3}{8}$ pounds, and the other weighs $4\frac{1}{2}$ pounds. What is the difference in their weights?		1.
2. A boy who was 4 feet tall 12 months ago has grown $\frac{1}{6}$ inch each month since then. How tall is he now?		2.
3. Mr. Smith has 4860 pounds of potatoes. One bushel weighs 60 pounds. Find the value of these potatoes at \$1.80 per bushel?		3.
4. How many pounds of butter at 60c per pound must one trade at the store for 100 pounds of flour at 6c per pound?		4.
5. A bus left Edmonton to go to Calgary at 4:30 P.M., a distance of 200 miles. The average speed was 40 miles per hour. When would the bus arrive in Calgary?		5.
6. A man earns \$1800 per year. How much money will he need to save each month if he wishes to save \$108.00 during the year?		6.
7. In a swimming race Jean swam twice the length of a 50 foot pool in $1\frac{7}{8}$ minutes. Doris swam the same distance in $1\frac{3}{4}$ minutes. What fraction of a minute was Doris' time less than Jean's?		7.
8. When oranges are 20c for 6, how many dozen can be bought for \$2.40?		8.
9. Jim had a strip of leather $2\frac{1}{4}$ yds. long. He cut off a piece $\frac{1}{4}$ yd. long to make handles for his trunk. He cut off another piece $\frac{1}{8}$ yd. long to make bookmarks. How much did he have left?		9.
10. How much would it cost to fence a piece of ground 10 yards long and 6 yards wide if fencing costs 15c a foot?		10.

Number correct x3

EDMONTON ARITHMETIC SURVEY TESTS

Designed for Use in September

SERIES
A

ACCURACY, LANGUAGE AND FUNDAMENTAL OPERATIONS,
PROBLEMS

BEGINNING
GRADE
6

NAME SCHOOL DATE

SCORE SUMMARY

PARTS A — ACCURACY

Pupil's
Score

PART B—LANGUAGE AND FUNDAMENTAL
OPERATIONS (30)

1. Addition (7)

..... x 1 =

2. Subtraction (7)

PART C—ARITHMETIC PROBLEMS (10)

3. Multiplication (7)

..... x 3 =

4. Division (7)

TOTAL—PARTS B & C (60)

5. Fractions - Add. (6)

weighted

6. Fractions - Subt. (6)

TOTAL — PART A (40)

TOTAL —PARTS A, B AND C

Consult Memo for Administering and Scoring Directions

PART A—ACCURACY

1. ADD: (4 minutes)

		845	698		6157	5066
		9	475	895	4804	2622
96	\$1.75	56	696	977	9284	9159
41	2.67	78	484	738	6747	8478
39	3.38	429	375	528	8928	6294
			764	957	6567	3536

2. SUBTRACT: (4 minutes)

228	\$74.94	8003	384905	15401	620045	34877
42	68.85	6208	248996	5842	584827	19818

3. MULTIPLY: (6 minutes)

721	3219	\$9.50	906	7328
8	61	35	47	209
7309	6485			
87	390			

4. DIVIDE (5 minutes)

$8 \overline{)256}$

$9 \overline{)4554}$

$16 \overline{)9123}$

$25 \overline{)\$62.50}$

$53 \overline{)10918}$

$38 \overline{)15395}$

$71 \overline{)17570}$

5. ADD FRACTIONS (2 minutes) Reduce to lowest terms.

$\frac{3}{5}$

$\frac{1}{12}$

$\frac{1}{3}$

$13\frac{3}{8}$

$7\frac{1}{2}$

$6\frac{1}{3}$

$\frac{1}{5}$

$5\frac{5}{12}$

$\frac{1}{6}$

$\frac{7}{8}$

$7\frac{7}{10}$

$4\frac{3}{4}$

6. SUBTRACT FRACTIONS: (2 minutes) Reduce to lowest terms.

$\frac{2}{3}$

$3\frac{1}{2}$

$8\frac{5}{6}$

$\frac{11}{12}$

$9\frac{7}{8}$

$15\frac{4}{5}$

$\frac{1}{3}$

$2\frac{1}{2}$

$\frac{1}{6}$

$\frac{2}{3}$

$2\frac{1}{2}$

$3\frac{2}{3}$

PART B—LANGUAGE AND FUNDAMENTAL OPERATIONS (20 minutes)

This is a test to see how well you remember facts about our number and measuring systems. You can do most of the questions in your head. The rest can be figured out with a little pencil work. Put your answer in the spaces at the right.

- 1. The answer in a subtraction question is called the: (1)_____
- 2. Which one of these numbers is a fraction: $1\frac{1}{2}$, 3, $4/5$? (2)_____
- 3. Write in figures: two hundred seven thousand sixteen. (3)_____
- 4. Find the sum of 18 and 7. (4)_____
- 5. How many days are there altogether in October and November? (5)_____
- 6. Which number is the multiplier in this example:
$$\begin{array}{r} 16 \\ \times 5 \\ \hline 80 \end{array}$$
 (6)_____
- 7. How many quarters are there in 4 gallons, 3 quarts? (7)_____
- 8. How many weeks are there in 2 years? .. (8)_____
- 9. How many lbs. are there in $1\frac{1}{2}$ tons? (9)_____
- 10. What is $\frac{1}{3}$ of 72?(10)_____
- 11. Supply the missing number: $\frac{5}{8} = \frac{\quad}{24}$ (11)_____
- 12. Supply the missing number: $\frac{9}{21} = \frac{3}{\quad}$ (12)_____
- 13. Find the average of 5, 12, and 7.(13)_____
- 14. How many hours and there in 180 minutes?(14)_____
- 15. How many feet are there in 84 inches? (15)_____
- 16. Which fraction is larger $7/12$ or $2/3$?(16)_____
- 17. Write in Arabic numbers XLVII.(17)_____
- 18. Write in Roman Numbers: 89.(18)_____

- 19. Reduce $12/15$ to its simplest form.(19)_____
- 20. Change $20/16$ to its simplest form.(20)_____
- 21. 6 is what fraction of 9?(21)_____
- 22. Write an example of an improper fraction having 9 for a numerator.(22)_____
- 23. At 2 for 15 cents, what will 8 oranges cost?(23)_____
- 24. How many minutes must be added to 145 mins. to make 3 hrs.?(24)_____

Write the correct name for each of these figures:



(25)_____



(26)_____

- 27. If you add $\frac{1}{2}$ and $\frac{1}{3}$ what will be the common denominator? (27)_____
- 28. At 18 cents a yard, what will 4 yards of ribbon cost? (28)_____
- 29. What number should come next in this series: 2, 4, 8, 16,(29)_____
- 30. What number should come next in this series: 1, 3, 6, 10(30)_____

PART C—ARITHMETIC PROBLEMS (20 minutes)

This is a test to see how well you can do arithmetic problems. You are to do as many questions as you can. Do all your work besides the problems and then put your answers in the proper places at the right.

PROBLEMS

WORK HERE

ANSWERS

1. John bought the following articles for school: note-books 45¢, pen 15¢, crayons 38¢, pencils 12¢, loose-leaf paper 40¢. How much did he pay the clerk? (1) _____
2. How much change would you receive from five dollars if you paid \$1.98 for groceries and \$1.15 for meat? (2) _____
3. Bill Jones delivers 125 papers a day to the customers on his route. How many papers will he deliver in a month if the papers are published 25 times in that month? (3) _____
4. Mary made the following marks on six arithmetic tests, Test 1 - 67; Test 2 - 69; Test 3 - 72; Test 4 - 73; Test 5 - 76; Test 6 - 75. Find her average mark. (4) _____
5. An automobile will travel 60 miles on 3 gallons of gasoline. How many miles will it travel on 9 gallons of gasoline? (5) _____
6. Jane weighed 89 pounds in September. In May the following years she weighed $93\frac{1}{4}$ pounds. How many pounds did she gain? (6) _____
7. A free reading book contains 132 pages. How many hours will it take to read this book if you read 22 pages in one hour? (7) _____
8. A school room is 40 feet wide and 55 feet long. What is the distance around this room in feet? (8) _____
9. A troop of Scouts went on a 3-day hike. The first day they walked $8\frac{1}{2}$ miles. The second day $11\frac{1}{4}$. The third day $11\frac{1}{4}$ miles. How many miles did they walk in all? (9) _____
10. Jim had 24 rabbits. He sold all but $\frac{1}{3}$ of them. How many rabbits did he sell? (10) _____

Number correct X 4 _____

EDMONTON ARITHMETIC ACHIEVEMENT TESTS

SERIES
3FINAL
GRADE 6

SCORE SUMMARY

Consult Manual for Administering and Scoring Directions

	A	B	C	B & C
Pupil's Score				
	60	40	60	100
Pupil's Percentile Rank				
	%ile		%ile	

PART A—ACCURACY

VALUE—1 mark each

1. ADDITION (4 minutes)

	68	5.1	8	3.58
	74	9.8	321	17.29
4.125	80	6.7	92	9.14
2.450	53	7.4	1458	1.98
3.625	79	8.8	65	38.05
			704	5.47
353	\$84.75		7253	\$ 26.88
974	56.46	48526	8947	308.40
357	47.88	73750	5386	42.75
542	74.53	64087	4658	8.94
629	25.74	80696	9456	287.09
375	61.91	57894	7048	9.49

2. SUBTRACTION (3 minutes)

5 4 1	3 0 0 4	\$1 0 5.0 0	5 6 3.3	1 2 9 0 3
2 1 7	1 2 5 7	9 8.4 5	3 0 7.4	5 3 4 9
7.3 2 5	8 7 0 2 5	8 1 2 6 4.0	3 4 0 2 1 6 3	1 8 7 1 4.6 3
.9 5 5	6 0 5 8 7	8 0 3 1 5.7	1 7 0 5 8 3 7	3 8 0 8.0 9

3. ADD FRACTIONS (2 minutes)

$3\frac{3}{4}$	$4\frac{2}{3}$	$2\frac{3}{8}$	$\frac{3}{4}$	$13\frac{7}{12}$
$4\frac{1}{8}$	$5\frac{5}{6}$	$1\frac{1}{6}$	5	$\frac{1}{2}$
		$4\frac{1}{4}$	$\frac{8}{10}$	$6\frac{3}{8}$

4. SUBTRACT FRACTIONS (2 minutes)

8	$9\frac{2}{5}$	$11\frac{2}{3}$	$13\frac{3}{4}$	$8\frac{3}{16}$
$9\frac{7}{8}$	$4\frac{4}{5}$	$7\frac{1}{2}$	$8\frac{11}{16}$	$2\frac{1}{8}$

5. MULTIPLICATION (5 minutes)

$$\begin{array}{r} 9564 \\ 57 \\ \hline \end{array}$$

$$\begin{array}{r} 427 \\ .78 \\ \hline \end{array}$$

$$\begin{array}{r} 8498 \\ 83 \\ \hline \end{array}$$

$$\begin{array}{r} 56.7 \\ .08 \\ \hline \end{array}$$

$$\begin{array}{r} 6709 \\ 69 \\ \hline \end{array}$$

$$\begin{array}{r} 3.69 \\ 7.4 \\ \hline \end{array}$$

$$\begin{array}{r} 4865 \\ 47 \\ \hline \end{array}$$

$$\begin{array}{r} 7.012 \\ 4.2 \\ \hline \end{array}$$

$$\begin{array}{r} 8579 \\ 468 \\ \hline \end{array}$$

$$\begin{array}{r} 48.63 \\ 9.6 \\ \hline \end{array}$$

6. DIVISION (6 minutes)

$$31 \overline{) 775}$$

$$7 \overline{) 63}$$

$$47 \overline{) 7246}$$

$$8 \overline{) 4.48}$$

$$19 \overline{) 35624}$$

$$.35 \overline{) .2345}$$

$$83 \overline{) 41206}$$

$$46 \overline{) 237.82}$$

$$507 \overline{) 12562}$$

$$3.7 \overline{) 31.931}$$

7. MULTIPLY FRACTIONS (2½ minutes)

$$\frac{3}{5} \times 1\frac{1}{4} =$$

$$9\frac{1}{6} \times \frac{2}{5} =$$

$$5\frac{1}{10} \times 2\frac{1}{2} =$$

$$2\frac{5}{8} \times 5\frac{1}{3} =$$

$$96 \times \frac{2}{3} =$$

8. DIVIDE FRACTIONS (2½ minutes)

$$\frac{9}{10} \div \frac{5}{6} =$$

$$2\frac{1}{8} \div 9 =$$

$$2\frac{1}{2} \div \frac{1}{4} =$$

$$5\frac{3}{4} \div \frac{1}{12} =$$

$$8 \div 8\frac{2}{3} =$$

PART B—LANGUAGE AND FUNDAMENTAL OPERATIONS VALUE—1 mark each

DIRECTIONS: Do as many of these problems as you can. The answers for most of them can be worked out in your head. For the rest, paper is provided for making calculations.

Answers

Answers

1. Write as decimal fractions: $\frac{1}{2}$, $\frac{5}{1000}$ (1) _____
2. Write 200 million 15 thousand 5 in figures. _____ (2) _____
3. If you are dividing a number by 28, what is the largest remainder you can have? _____ (3) _____
4. Write as mixed numbers: 1.3, 2.75 _____ (4) _____
5. Write the Roman Numeral MCMXLIX in Arabic figures. _____ (5) _____
6. If a man is 75 years old, what fraction of a century has he lived? _____ (6) _____
7. The rainfall for May was 2.25 inches. Express this amount as a mixed number _____ (7) _____
8. Approximately how many whole bushels are there in $199\frac{3}{4}$ bushels? _____ (8) _____
9. Which is the longer distance, $4\frac{1}{2}$ miles or 4.29 miles? _____ (9) _____
10. What does $\frac{7}{8}$ become when it is inverted? _____ (10) _____
11. Can $1\frac{1}{2}$ be the sum of two mixed numbers? _____ (11) _____
12. When you divide \$14.08 by 7, is the remainder 1c or \$1.00? _____ (12) _____
13. Does a deposit increase or decrease your balance in the Bank? _____ (13) _____
14. Write 5 ten-thousandths as a decimal fraction _____ (14) _____
15. Which zero may you cross off in .040 without changing the value? _____ (15) _____
16. 45 yds. is what decimal fraction of 100 yds.? _____ (16) _____
17. Divide 1.46 by .01 by moving the decimal point _____ (17) _____
18. Multiply 70.146 by 100 by moving the decimal point _____ (18) _____
19. How many digits are there in the number 136,405? _____ (19) _____
20. 25 is what fraction of 40? Express the answer in its lowest terms _____ (20) _____
21. What is .763 to the nearest hundredths? _____ (21) _____
22. Is $\frac{1}{2} \times \frac{3}{4}$ more than or less than $\frac{1}{2} \div \frac{3}{4}$? _____ (22) _____

23. When adding or subtracting unlike fractions they must be changed to the same _____ (23) _____
 24. The product of .2 and .3 will be 6 (tenths, hundredths, thousandths)? _____ (24) _____
 25. What is the difference between $8\frac{1}{2}$ and $5\frac{1}{2}$? _____ (25) _____
 26. What is the perimeter in feet of a carpet 9 ft. by 9 yd.? _____ (26) _____
 27. Copy the letters used to show the right angles _____ (27) _____
-
28. Divide $\frac{1}{2}$ of 32 by 16 _____ (28) _____
 29. Two cities are 3 inches apart on a map whose scale is $\frac{1}{4}$ "=100 miles. What is their real distance apart? _____ (29) _____
 30. 71 is $\frac{1}{8}$ of what number? _____ (30) _____
 31. Find the average of .06, .04, .05 _____ (31) _____
 32. Add — 5 bu. 2 pk.
 4 bu. 2 pk.
 3 pk.
_____ (32) _____
 33. Subtract — 20 Tons 600 lbs.
 17 Tons 1500 lbs.
_____ (33) _____
 34. Multiply — 17 yd. 9 in.
 12
_____ (34) _____
 35. Divide — 10)11 lbs. 4 oz. _____ (35) _____
 36. What is the area of a room 10 feet by 8 feet? _____ (36) _____
 37. How many acres are there in 640 sq. rods? _____ (37) _____
 38. Multiply 4.2 by :08 _____ (38) _____
 39. Divide .005 by .05 _____ (39) _____
 40. What is the answer when $\frac{4}{5}$ is divided by $\frac{2}{3}$? _____ (40) _____

No. Correct _____

PART C—ARITHMETIC PROBLEMS

TIME—20 minutes

VALUE—5 marks each

DIRECTIONS: Work as many of the following problems as you can. Do your work in the spaces beside each problem. Then put your answers in the proper places at the right. Work quickly and accurately.

1. Two towns on a map are $3\frac{1}{2}$ " apart. The scale of the map is 1" equals 120 miles. The towns are how many miles apart?

(1) _____

2. Mrs. Jones bought \$1.75 worth of potatoes at 8 pounds for a quarter. How many pounds of potatoes did she buy?

(2) _____

3. On June 5, 1.44 inches of rain fell in 24 hours. What decimal fraction was this per hour?

(3) _____

4. Ross swam once around the East End swimming pool which is 98.3 feet long and 42.8 feet wide. How many feet did he swim?

(4) _____

5. A car is driven 9.23 hours at an average speed of 36.5 miles per hour. How many miles did the car travel in that trip?

(5) _____

7. Uncle Pete's ranch is $4\frac{2}{3}$ miles long and $3\frac{3}{8}$ miles wide. How many square miles are there in this ranch?

(7) _____

8. Don's father sold $\frac{75}{200}$ of the 200 acres in his farm. What fraction of the farm did he have left?

(8) _____

9. Mary is making a pair of curtains for each of the two windows in her room. She needs $5\frac{1}{2}$ feet of material for each curtain. She needs how many feet of material for the two pairs of curtains?

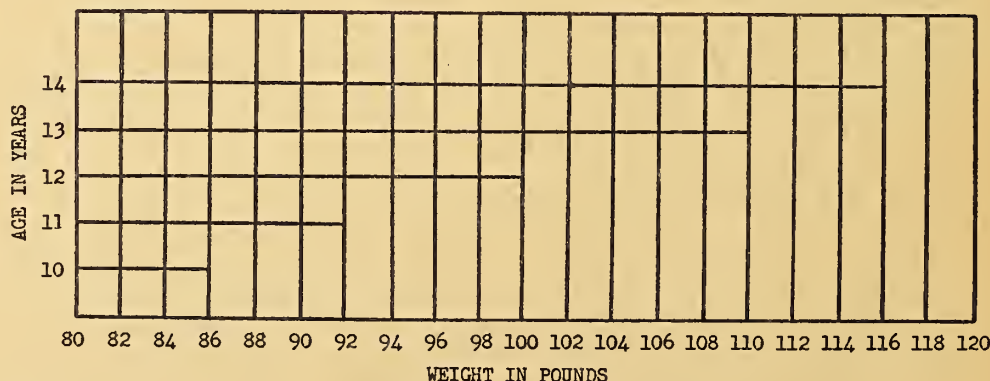
(9) _____

10. Twenty four farmers sold 17,280 dozen eggs in one year. How many dozen, on the average, did each farmer sell per month?

(10) _____

11. Jack made the graph below to show his weight during five years. How much did he gain between the ages of 10 and 13?

(11) _____



6. Helen has $5\frac{3}{4}$ yds. of blue ribbon to use for party decorations. Into how many pieces each three quarters of a yard long can she cut this ribbon?

(6) _____

12. The distance from Edmonton to Calgary is 194 miles. The C.P.R. passenger train "The Chinook" leaves the south side station at 8:15 a.m. and arrives at Calgary at 1:05 p.m. How much time does it take for this train to go the 194 miles?

(12) _____

No. Correct x5 _____



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